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AGARICUS IN NORTH AMERICA: TYPE STUDIES

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Summary

Type specimens of *Agaricus* taxa from North America are described, and nomenclatural problems in the genus are discussed.

Although the genus *Agaricus* is easily distinguished from other agaric genera, infrageneric taxonomy appears difficult and has received little in-depth coverage in North America. Regional keys during the past century have covered New York state (Peck, "1883", 1884), the Pacific coast and tropical U.S., particularly Florida (Murrill, 1912, 1918, 1938), the Great Lakes region (Kauffman, 1918), the Chapel Hill, N.C., area (Coker, 1928) and western Washington state (Hotson & Stuntz, 1938). The former North American works, with the exception of Hotson & Stuntz, were superficial by present standards, relying primarily on macroscopic data for species determinations. The following studies of type specimens serve to more accurately associate names and circumscriptions of North American taxa and to lay the groundwork for detailed floristic studies of the genus.

Explanation of two new descriptive terms, campestroid and placomycetoid, is in order. A campestroid stature, exemplified by *A. campestris* L. per Fr., exhibits a pileus diameter-stipe length ratio of one or greater than one. Also frequently associated with this stature are a thick-set fruit body with an equal or subequal stipe and a meadow or pasture habitat. Placomycetoid stature, exemplified by *A. placomyces* Pk., exhibits a pileus diameter-stipe length ratio of less than one. Frequently associated with this stature are a thin-fleshed fruit body with a slender, bulbous stipe and a woodland habitat. These terms were created to describe distinct stature types and were based on the two most common species of the respective statures found in the area where this study was made.

Certain descriptions may be incomplete due to the lack of sufficient type material. In some cases only a portion of the type collection was made available for study, but in other cases, although the greatest care was taken with aged and fragile fruit bodies, poor condition of original material, age, or less than scrupulous care have reduced collections to fragments or to dust. When only one collection by an originating author survives, but is not specifically labelled "type", the term "implicit holotype" has been applied.

Specimens from the following herbaria were examined: the National Fungus Collections (BPI), Cornell University (CUP), the Royal Botanic Gardens (K), the University of Michigan (MICH), the University of North Carolina (NCU), the New York Botanical Garden (NY), New York State Museum (NYS), and the University of Tennessee (TENN). Herbarium abbreviations are from those established by Lanjouw & Stafleu (1964).

Agaricus arvensis var. *abruptus* Peck. 1894. N.Y. State Mus. Bull. 48: 239.

≡ *A. abruptus* Peck. 1900. N.Y. State Mus. Mem. 4, 3: 163-164. (non *A. abruptus* Fries. 1874. Hym. Eur. p. 245).

≡ *A. abruptibulbus* Peck. "1904" (1905). N.Y. State Mus. Bull. 94: 36.

TYPE SPECIMEN (lectotype, *des. mihi*): NYS, West Albany, N.Y., --.92, coll. & det. C. H. Peck, s.n. (!)

Stature of carpophore placomycetoid; pileus ovate to convex when young, expanded to plane when mature, to 10 cm diam, pale gold-tan when dried; surface smooth; dried flesh to 4 mm thick at disc, thinning to < 1 mm at margin. Lamellae (mature) deep chocolate brown, free, to 2 mm deep. Stipe to 13 cm long, bulbous, often rimmed and depressed at base, appearing fibrous, concolorous with pileus; ring superior, bearing floccose patches on reverse, more or less appendiculate, pale gold when dried.

Hyphae of pileus cuticle tightly interwoven, repent; pileocystidia lacking; hyphae of pileus flesh to 12.0 μ m diam, occasionally inflated, thin-walled, without clamp connections. Lamella trama irregular; hyphae to 4.5 μ m diam, uninflated; basidia 6.0-9.2 x 15.3-20.0 μ m, 4-sterigmate, without clamp connections; cystidia lacking. Hyphae of stipe surface above ring 3.0-12.2 μ m diam, parallel, tightly packed. Hyphae of ring 3.0-10.7 μ m diam. Cells of universal veil (stipe surface below ring, patches on lower surface of ring) to 25.0 μ m diam, irregularly inflated, without clamp connections, thin-walled, hyaline.

Spores 6.0-7.5 x 4.5-5.5 μ m, ellipsoid to ovoid; wall dark brown, 0.6 μ m thick; apiculus merely a hyaline spot in the spore wall or indiscernible.

Schaeffer macrochemical reaction: negative.

Note: Collection data is insufficient to determine which collection (if only one) labelled by Peck as *A. arvensis* var. *abruptus* actually formed the basis for the type description. I have chosen the above collection as lectotype because it is the better of two collections labelled by Peck and dated prior to the publication of the original description. The lectotype contains several fruit bodies including immature forms.

Agaricus alabamensis Murrill. 1922. *Mycologia* 14: 202-203.

TYPE SPECIMEN (neotype *des. mini*): TENN, no. 10182, Gainesville, Fla., 7.vii.48, coll. W. A. Murrill, det. B. F. Isaacs. (!)

Stature of carpophore campestroid; pileus convex, not fully expanded, 6.5 cm diam, dull gold when dried; surface smooth to fibrillose; dried flesh to 7 mm thick at disc, thinning to < 1 mm at margin; margin projecting up to 2 mm. Lamellae (mature) deep chocolate brown, free, to 3 mm deep. Stipe tapering upward, to 6 cm long, slightly bulbous, appearing fibrous, concolorous with pileus when dried; ring superior, persistent, thicker near margin, dull gold when dried.

Hyphae of pileus cuticle loosely interwoven, repent; pileocystidia lacking; hyphae of pileus flesh 3.0-13.8 μ m diam, occasionally slightly inflated, without clamp connections, thin-walled. Lamella trama irregular; hyphae 3.0-9.2 μ m diam, uninflated; basidia 7.5 x 18.5-23.0 μ m, 4-sterigmate, without clamp connections; cheilocystidia scattered, broadly clavate to napiform, to 12.2 μ m diam. Hyphae of stipe surface above ring 3.0-18.5 μ m diam, parallel, tightly packed. Hyphae of ring 3.0-12.2 μ m diam. Cells of universal veil (stipe surface below ring) irregularly inflated, to 18.5 μ m diam, without clamp connections, thin-walled, hyaline.

Spores 5.5-6.0 x 3.8-4.5 μ m, broadly ellipsoid; wall dark brown, 0.6 μ m thick; apiculus indiscernible.

Schaeffer macrochemical reaction: negative.

Note: Because the original type collection of this taxon (NY, Auburn, Ala., 19.v.01, coll. F. S. Earle, det. W. A. Murrill, s.n.) is not only badly broken up but also overgrown with a contaminant fungus and therefore unidentifiable, I have selected the above as neotype. The collection contains three mature fruit bodies.

Agaricus alashuanus Murrill. 1938. *J. Elisha Mitchell Sci. Soc.* 54: 140.

TYPE SPECIMEN (holotype, explicit): FLAS, Gainesville, Fla., 17.viii.37, coll. & det. W. A. Murrill, no. 15917. (!)

Stature of carpophore placomycetoid; mature pileus convex or slightly depressed, to 2 cm diam, deep tan with brown, appressed, fibrillose scales when dried; dried flesh to 2 mm thick at disc, thinning to < 1 mm at margin. Lamellae (mature) deep chocolate brown, free, to 2 mm deep. Stipe bulbous, in fragments, appearing fibrous, concolorous with pileus when dried; ring gold when dried.

Hyphae of pileus cuticle loosely interwoven, usually repent; pileocystidia loosely fasciculate, 4.5-7.5 μm diam, irregularly inflated, unbranched; hyphae of pileus flesh 9.2-15.3 μm diam, occasionally inflated, without clamp connections, thin-walled. Lamella trama irregular; hyphae 3.0-12.2 μm diam, slightly inflated; basidia 6.0-7.5 x 10.7-15.3 μm , 4-sterigmate, without clamp connections; cheilocystidia sparse, saccate to napiform, to 9.2 μm diam. Hyphae of stipe surface above ring 3.0-15.3 μm diam, parallel, tightly packed. Hyphae of ring 3.0-6.0 μm diam. Cells of universal veil (stipe surface below ring) regularly elongated, inflated, to 20.0 μm diam, without clamp connections, thin-walled, hyaline.

Spores 4.5-6.0 x 3.0-3.8 μm , broadly ellipsoid to ovoid; lacking germ pore (SEM); wall dark brown, 0.6 μm thick; apiculus minutely papillate or indiscernible, hyaline.

The type collection consists of two broken fruit bodies, both mature. There are also some very brief notes written by Murrill contained with the specimens.

Schaeffer macrochemical reaction: negative.

Agaricus albolutescens Zeller. 1938. *Mycologia* 30: 468-469.

TYPE SPECIMEN (holotype, explicit): NY, Lincoln Co., Ore., 21.xi.34, coll. G. S. Burlingham, det. S. M. Zeller, no. 9158. (!)

Stature of carpophore campestroid; pileus convex to plane, to 6.5 cm diam, golden yellow when dried; surface smooth, fibrous with age; dried flesh to 2 mm thick at disc, thinning to < 1 mm at margin. Lamellae (mature) deep chocolate brown, free, to 3 mm deep. Stipe bulbous, to 5 cm long, appearing fibrous, concolorous with pileus or slightly darker when dried; ring superior, somewhat appendiculate, gold when dried.

Hyphae of pileus cuticle interwoven, usually repent; pileocystidia scattered, 4.5-5.5 μm diam, unbranched; hyphae of pileus flesh 6.0-21.5 μm diam, inflated, without clamp connections, thin-walled. Lamella trama irregular; hyphae 3.0-13.8 μm diam, occasionally inflated; basidia 6.0-8.5 x 21.5-24.5 μm , 4-sterigmate, without clamp connections; cystidia lacking. Hyphae of stipe surface above ring 4.5-10.7 μm , parallel, tightly packed. Hyphae of ring 3.0-7.5 μm diam. Hyphae of universal veil (stipe surface below ring) inflated, to 30.5 μm diam, without clamp connections, thin-walled, hyaline.

Spores (4.5) 6.0-7.0 x 3.8-4.5 μm , ovoid to ellipsoid; wall dark brown, 0.6 μm thick; apiculus indiscernible or a hyaline spot in the spore wall.

The type specimen consists of two fruit bodies in separate packets. Both fruit bodies are mature; notes on the fresh condition accompany the specimens.

Schaeffer macrochemical reaction: negative.

Agaricus alligator Murrill. 1945. Quart. J. Florida Acad. Sci. 8: 193-194.

TYPE SPECIMEN (holotype, explicit): FLAS, Gainesville, Fla., 17.x.4, coll. & det. W. A. Murrill, no. 19566. (!) Isotype: TENN, no. 21101. (!)

Stature of carpophore campestroid; mature pileus convex, to 5.5 cm diam, dull gray-gold when dried; surface silky, imbricate-scaly on disc; dried flesh to 7 mm thick at disc, thinning to 1 mm at margin; margin projecting 1 mm. Lamellae (mature) deep chocolate brown, free, to 5 mm deep. Stipe equal, to 5 cm long, appearing fibrous, concolorous with pileus when dried; ring median, more or less appendiculate, gray-gold when dried.

Hyphae of pileus cuticle loosely interwoven, usually repent; pileocystidia 3.8-6.0 μ m diam, irregularly inflated, branched; hyphae of pileus flesh 4.5-10.7 μ m diam, inflated, without clamp connections, thin-walled. Lamella trama irregular; hyphae 3.0-10.0 μ m diam, occasionally inflated; basidia 7.5 x 9.2-15.3 μ m, 4-sterigmate, without clamp connections; cheilocystidia scattered, napiform, brownish, 10.7-15.3 μ m diam. Hyphae of stipe surface above ring 4.5-9.2 μ m diam, parallel, tightly packed. Hyphae of ring 3.0-10.7 μ m diam. Cells of universal veil (stipe surface below ring) inflated, to 15.3 μ m diam, without clamp connections, thin-walled, hyaline.

Spores 6.0-7.5 x 4.5-6.0 μ m, ovoid to broadly ellipsoid; lacking germ pore (SEM); wall dark brown, 0.6 μ m thick; apiculus indiscernible.

The type specimen contains numerous fragments of mature and young fruit bodies as well as a sketch and notes on the fresh condition written by Murrill.

Schaeffer macrochemical reaction: negative.

Agaricus alutaceus sp. nov. ($\equiv$ *A. californicus* var. *alutaceus* Peck, nom. herb.)

TYPE SPECIMEN (holotype): NYS, Palo Alto, Calif., no date, coll. C. F. Baker, det. C. H. Peck, s.n. (!)

Statura campestroidia; pileo 15 cm diam, plano, alutaceo, summo serico; stipito aut aequo aut bulboso, 9 cm long; annulo medio vel superiore; cheilocystidiis absentes; cellulis integumentorum universorum -20.0 μ m diam; sporis 4.5-6.0 x 3.8-4.5 μ m.

Stature of carpophore campestroid; mature pileus plane, to 15 cm diam (Peck, notes), pale tan (Peck, notes), gray-tan when dried; surface silky-fibrillose; dried flesh to 2 mm thick at disc, thinning to <1 mm at margin. Lamellae (mature) deep chocolate brown, free, to 4 mm deep. Stipe more or less bulbous, to 9 cm long (Peck, notes), dark brown when dried; ring median to superior, thick, gold when dried.

Hyphae of pileus cuticle loosely interwoven, usually repent; pileocystidia undifferentiated; hyphae of pileus flesh 4.5-15.3 μ m diam, occasionally inflated, without clamp connections, thin-walled. Lamella trama irregular; hyphae 2.3-10.7 μ m diam, occasionally slightly inflated; basidia 4.5-7.5 x 10.7-15.3 μ m, 4-sterigmate, without

clamp connections; cystidia lacking. Hyphae of stipe surface above ring 1.5-3.0 μm diam, parallel, tightly packed. Hyphae of ring 3.0-9.2 μm diam. Cells of universal veil (stipe surface below ring) variously inflated, to 20.0 μm diam, without clamp connections, thin-walled, hyaline.

Spores 4.5-6.0 x 3.8-4.5 μm , subglobose to broadly ellipsoid or ovoid; wall dark brown, 0.6 μm thick; apiculus minutely papillate, hyaline.

Schaeffer macrochemical reaction: negative.

Note: *Agaricus californicus* is a *nomen dubium* (q.v.) and this variety name a *nomen herbariorum*. Peck's name is used in acknowledgement of Peck's recognition of this taxon as distinct. The type collection consists of a single mature fruit body and brief notes on its fresh condition.

This taxon produces large fruit bodies resembling those of *A. blazei*, yet distinct. Fruit bodies of *Agaricus alutaceus* are darker in color, bear smaller spores and produce less highly inflated universal veil hyphae than *A. blazei*. Further collections of *A. alutaceus* from the west might also establish a difference in habitat preference, particularly since *A. blazei* is currently known only from the coastal plain area of Florida and South Carolina.

Agaricus angustifolius Murrill. 1918. *Mycologia* 10: 74.

TYPE SPECIMEN (holotype, explicit): NY, Jamaica, 30.x.02, coll. F. S. Earle, det. W. A. Murrill, no. 287. (!)

Stature of carpophore placomycetoid; mature pileus expanded, to 3 cm diam, golden brown with dark brown fibrils when dried; dried flesh 1 mm thick at disc, thinning at margin. Lamellae (mature) deep chocolate brown, free, to 1 mm deep. Stipe equal, to 3.5 cm long, appearing fibrous, dark brown when dried; ring absent on type material.

Hyphae of pileus cuticle interwoven, repent; pileocystidia lacking, scales formed by undulations of cuticle; hyphae of pileus flesh 6.0-15.3 μm , inflated, without clamp connections, thin-walled. Lamella trama irregular; hyphae 3.0-10.7 μm diam, occasionally inflated; basidia 4.5-6.0 x 13.8-15.3 μm , 4-sterigmate, without clamp connections; cystidia indiscernible (gill edge infected with second fungus). Hyphae of stipe surface near pileus 4.5-13.8 μm diam, parallel, tightly packed. Hyphae of ring absent. Cells of universal veil (stipe surface near base) inflated; to 23.0 μm diam, without clamp connections, thin-walled, hyaline.

Spores 5.5-6.0 x 3.0 μm , ellipsoid; wall dark brown, 0.6 μm thick; apiculus minutely papillate, hyaline.

The type collection consists of three broken fruit bodies, all mature, and brief notes by Murrill on the fresh condition of the specimens.

Schaeffer macrochemical reaction: negative.

Agaricus approximans Peck. 1908. N.Y. State Mus. Rep. 131: 33.

TYPE SPECIMEN (holotype, implicit): NYS, Trenton, N.J., 5.ix.08, coll. E. B. Sterling, det. C. H. Peck, s.n. (!)

Stature of carpophore placomycetoid; mature pileus conic or campanulate, umbonate, to 4 cm diam, pale gold when dried; surface radially rimose, excluding the umbo, covered with brownish squamules; dried flesh to 4 mm thick, thinning to <1 mm at margin. Lamellae (mature) deep chocolate brown, free, to 3 mm deep. Stipe equal, to 4.5 cm long, appearing fibrous, concolorous with pileus when dried; ring median to superior, thick, draping, dingy gold when dried.

Hyphae of pileus cuticle loosely interwoven, repent; pileocystidia abundant, scattered or loosely fasciculate, to 10.7 μ m diam, unbranched; hyphae of pileus flesh 6.0-16.8 μ m diam, inflated, without clamp connections, thin-walled. Lamella trama irregular; hyphae 3.0-9.2 μ m diam, irregularly inflated; basidia 4.5-6.0 x 10.7-15.3 μ m, 4-sterigmate, without clamp connections; cystidia lacking. Hyphae of stipe surface above ring 3.0-7.5 μ m diam, parallel, tightly packed. Hyphae of ring 3.0-7.5 μ m diam. Cells of universal veil (stipe surface below ring) inflated, to 23.0 μ m diam, without clamp connections, thin-walled, hyaline.

Spores 5.3-7.5 x 3.0-4.5 μ m, ellipsoid to ovoid; lacking germ pore (SEM); wall dark brown, less than 0.6 μ m thick; apiculus minutely papillate, hyaline or indiscernible.

Schaeffer macrochemical reaction: negative.

Note: The specimen is considered an implicit holotype because it is the only collection under this name among the Peck specimens and because its date, collection site and collector coincide with the data in the protologue. The collection consists of thirteen fruit bodies plus fragments; all specimens are mature.

Agaricus argenteus Braendle in Peck. 1899. Bull. Torrey Bot. Club 26: 68.

TYPE SPECIMEN (holotype, implicit): NYS, Washington, D.C., -.xi.-, coll. and det. F. J. Braendle, s.n. (!)

Stature of carpophore campestroid; pileus convex to plane, to 4.5 cm diam, dingy tan when dried; surface fibrillose; dried flesh to 1 mm thick at disc, thinning at margin. Lamellae (mature) deep chocolate brown, free, to 4 mm deep. Stipe equal, to 3.5 cm long, appearing fibrous, concolorous with pileus when dried; ring absent on type material.

Hyphae of pileus cuticle tightly interwoven, repent; pileocystidia lacking; hyphae of pileus flesh to 15.3 μ m diam, occasionally inflated, without clamp connections, thin-walled. Lamella trama irregular; hyphae to 6.0 μ m diam, usually uninflated; basidia 7.5-9.2 x 15.3-21.5 μ m, 4-sterigmate, without clamp connections; cystidia lacking. Hyphae of stipe surface above ring to 16.8 μ m diam, parallel, tightly

packed. Ring tissue absent on type material. Hyphae of universal veil (stipe surface near base) inflated, to 26.0 μm diam, without clamp connections, thin-walled, hyaline.

Spores 9.2-13.0 x 6.0-7.5 μm , ellipsoid to ovoid; wall dark brown, less than 0.6 μm thick; apiculus papillate, hyaline or indiscernible.

Schaeffer macrochemical reaction: negative.

Note: This is considered an implicit holotype because it is the only collection under this name among the Peck specimens and because its date, collection site, and collector coincide with the data in the original description. The specimen consists of eleven mature fruit bodies plus fragments.

Agaricus cylindriceps var. *aureus* Murrill. 1945. J. Florida Acad. Sci. 8: 194.

TYPE SPECIMEN (holotype, explicit): FLAS, Gainesville, Fla., 23.x.42, coll. & det. W. A. Murrill, no. 20495. (!)

Stature of carpophore campestroid; pileus cylindric, to 4 cm diam, dull gold with golden brown scales when dried; dried flesh to 5 mm thick at disc, thinning to < 1 mm at margin; margin inrolled. Lamellae (mature) deep chocolate brown, free, to 4 mm deep. Stipe equal, to 3.0 cm long, appearing fibrous, concolorous with pileus; ring superior, gold when dried.

Hyphae of pileus cuticle interwoven, usually repent; pileocystidia fasciculate, to 6.0 μm diam, unbranched; hyphae of pileus flesh 4.5-15.3 μm diam, inflated, without clamp connections, thin-walled. Lamella trama irregular; hyphae 2.3-3.8 μm diam, uninflated; basidia 7.5 x 13.8-20.0 μm , 4-sterigmate, without clamp connections; cystidia lageniform, ventricose-rostrate or pseudoparaphysoid, to 7.5 μm diam, scattered. Hyphae of stipe surface above ring 3.0-7.5 μm diam, parallel, tightly packed. Hyphae of ring 2.3-7.5 μm diam. Hyphae of universal veil (stipe surface below ring) uninflated, to 6.0 μm diam, without clamp connections, thin-walled, hyaline.

Spores (5.3)6.0 x (3.8)4.5 μm , ovoid to ellipsoid; lacking germ pore (SEM); wall dark brown, 0.6 μm thick; apiculus papillate on immature spores, indiscernible on mature spores.

The type specimen consists of one mature fruit body plus fragments, as well as very brief notes by Murrill.

Schaeffer macrochemical reaction: negative.

Agaricus subplacomyces var. *badius* Murrill. nom. illeg. 1941. Mycologia 33: 447.

$\equiv$ *A. placomyces* var. *badius* Murrill. nom. herb.

TYPE SPECIMEN (holotype): FLAS, Gainesville, Fla., 7.vi.38, coll. & det. W. A. Murrill, no. 16402. (!) Isotypes: NY, no. 16402. (!); NCU, s.n. (!); BPI, s.n. (!)

Stature of carpophore placomycetoid; mature pileus convex, to 5 cm diam, dull gold with brown disc and scales when dried; surface heavily squamulose on disc, glabrous near the margin; dried flesh to 2 mm thick at disc, thinning to < 1 mm at margin. Lamellae (mature) deep chocolate brown, free, to 3 mm deep. Stipe bulbous, to 10 cm long, concolorous with pileus when dried; ring more or less appendiculate, superior when adhering to stipe, gold when dried.

Hyphae of pileus cuticle loosely interwoven; pileocystidia fasciculate or scattered, 3.0-6.0 μ m diam, unbranched; hyphae of pileus flesh 4.5-18.5 μ m diam, occasionally inflated, without clamp connections, thin-walled. Lamella trama irregular; hyphae 3.0-6.0 (12.2) μ m diam, occasionally inflated; basidia 6.0-7.5 x 18.5-21.5 μ m, 4-sterigmate, without clamp connections; cheilocystidia napiform to broadly capitulate, 5.5-6.0 μ m diam, scattered. Hyphae of stipe surface above ring 4.5-13.8 μ m diam, parallel, tightly packed. Hyphae of ring 3.0-9.2 μ m diam. Cells of universal veil (stipe surface below ring) inflated, to 15.3 μ m diam, without clamp connections, thin-walled, hyaline.

Spores 5.5-6.0 x 3.0-4.5 μ m, ellipsoid to broadly ellipsoid or ovoid; wall dark brown, 0.6 μ m thick; apiculus minutely papillate or a hyaline spot in the spore wall.

Schaeffer macrochemical reaction: negative.

Note: As evidenced by a note with the type specimen, Murrill clearly meant this to be a variety of *A. placomyces*. The published protologue, however, cites the name as a variety of *A. subplacomyces*, an undescribed taxon. I therefore feel that this taxon, which is not closely related to *A. placomyces*, should bear Murrill's varietal name elevated to species rank. The collection consists of seven fruit bodies, two of which are entire. They are all mature specimens.

Agaricus bivelatoides Murrill. 1912. *Mycologia* 4: 297.

TYPE SPECIMEN (holotype, explicit): NY, Seatle, Wash., 20.x-1.xi.11, coll. & det. W. A. Murrill, no. 493. (!)

Pileus gray-tan with innate brownish fibrils when dried; dried flesh to 4 mm thick at disc, thinning to < 1 mm at margin. Lamellae (mature) deep chocolate brown, to 2 mm deep. Stipe concolorous with pileus when dried.

Hyphae of pileus cuticle loosely interwoven; pileocystidia scattered, 2.3-9.2 μ m diam, unbranched; hyphae of pileus flesh 3.0-15.3 μ m diam, occasionally inflated, without clamp connections, thin-walled. Lamella trama irregular; hyphae 3.0-9.2 μ m diam, uninflated; basidia 4.5-6.0 x 20.0-24.5 μ m, 4-sterigmate, without clamp connections; cheilocystidia napiform, scattered, 6.0-10.7 μ m diam. Hyphae of stipe surface near pileus 3.0-15.3 μ m diam, parallel, tightly packed. Hyphae of ring absent on type material. Universal veil tissue absent on type material.

Spores 5.5-6.0(7.0) x 3.8-4.5 μ m, ellipsoid; wall dark brown, 0.6 μ m thick; apiculus minutely papillate, hyaline.

The specimen consists solely of fragments.

Schaeffer macrochemical reaction: negative.

Agaricus blazei Murrill. 1945. Quart. J. Florida Acad. Sci. 8: 193.

TYPE SPECIMEN (holotype, explicit): FLAS, Gainesville, Fla., 24.iv.44, coll. R. W. Blaze, det. W. A. Murrill, no. 32911. (!)
Isotype: NY, s.n. (!)

Stature of carpophore campestroid; mature pileus subcylindric to subexpanded, to 7 cm diam, dull gold when dried; surface finely gold scaly; dried flesh to 11 mm thick at disc, thinning to < 1 mm at margin; margin projecting 1 mm. Lamellae (mature) deep chocolate brown, free, to 3 mm deep. Stipe equal to sub-bulbous, to 5.5 cm long, appearing fibrous, concolorous with pileus when dried; ring superior, membranous, dull gold when dried.

Hyphae of pileus cuticle interwoven, usually repent; pileocystidia loosely fasciculate, 3.0-6.0 μ m diam, branched or unbranched; hyphae of pileus flesh 3.0-10.7 μ m diam, occasionally inflated, without clamp connections, thin-walled. Lamella trama irregular; hyphae 3.0-6.0(10.7) μ m diam, occasionally inflated; basidia 5.5-7.5 x 15.3-20.0 μ m, 4-sterigmate, without clamp connections; cystidia lacking. Hyphae of stipe surface above ring 2.3-7.5 μ m diam, parallel, tightly packed. Hyphae of ring 1.5-6.0 μ m diam. Cells of universal veil (stipe surface below ring) inflated, to 26.0 μ m diam, without clamp connections, thin-walled, hyaline.

Spores 5.3-7.0 x 4.5-5.3 μ m, subglobose to ovoid or broadly ellipsoid; lacking germ pore (SEM); wall dark brown, 0.6 μ m thick; apiculus indiscernible or a hyaline spot in the spore wall.

The specimen consists of three immature and three mature fruit bodies as well as notes and a sketch by Murrill. The isotype contains one mature carpophore.

Schaeffer macrochemical reaction: negative.

Agaricus blockii Murrill. 1954. Mycologia 46: 112.

TYPE SPECIMEN (holotype, explicit): FLAS, Gainesville, Fla., 6.vii.50, coll. Dr. S. S. Block, det. W. A. Murrill, no. 21533. (!)

Stature of carpophore placomycetoid; mature pileus conic, to 4.5 cm diam, dull gold when dried; surface covered with delicate, appressed, fibrillose scales; dried flesh to 4 mm thick at disc, thinning to < 1 mm at margin; margin undulate. Lamellae (mature) deep chocolate brown, free, to 4 mm deep. Stipe tapering upward, to 4.5 cm long, appearing fibrous, concolorous with pileus when dried; ring median, more or less appendiculate, gold when dried.

Hyphae of pileus cuticle interwoven, usually repent; pileocystidia fasciculate or scattered, to 7.5 μm diam, unbranched; hyphae of pileus flesh 4.5-10.7 μm diam, occasionally inflated, without clamp connections, thin-walled. Lamella trama irregular, hyphae 3.0-6.0 μm diam, uninflated; basidia 6.0 x 12.2-15.3 μm , 4-sterigmate, without clamp connections; cystidia lacking. Hyphae of stipe surface above ring 3.0-12.2 μm diam, parallel, tightly packed. Hyphae of ring 4.5-10.7 μm diam. Cells of universal veil (stipe surface below ring) inflated, to 21.5 μm diam, without clamp connections, thin-walled, hyaline.

Spores 4.5-6.0 x 3.8-4.5 μm , broadly ellipsoid to ovoid, often matured to subglobose; lacking germ pore (SEM); wall dark brown, 0.6 μm thick; apiculus hyaline, minute,

The specimen consists of a single mature fruit body and notes, including a sketch, by Murrill.

Schaeffer macrochemical reaction: negative.

Agaricus cervinifolius Zeller. 1933. Mycologia 25: 388.

TYPE SPECIMEN (holotype, explicit): NY, Linn Co., Ore., 20.ix.32, coll. & det. S. M. Zeller, no. 5589 (!)

Stature of carpophore campestroid; mature pileus convex-expanded, to 10 cm diam, dull tan with gray-brown disc and scales when dried; dried flesh to 6 mm thick at disc, thinning to <1 mm at margin. Lamellae (mature) deep chocolate brown, free, to 6 mm deep. Stipe slightly bulbous, to 5 cm long, appearing fibrous, gray-brown when dried; ring superior when adhering to stipe, off-white when dried.

Hyphae of pileus cuticle interwoven, usually repent; pileocystidia fasciculate, to 10.7 μm diam, unbranched; hyphae of pileus flesh 3.0-21.5 μm diam, usually inflated, without clamp connections, thin-walled. Lamella trama irregular, hyphae 3.0-7.5 μm diam, occasionally inflated; basidia 6.0 x 18.5-21.5 μm , 4-sterigmate, without clamp connections; cystidia lacking (gill edge sterile, composed of interwoven hyphae). Hyphae of stipe surface above ring 4.5-20.0 μm diam, parallel, tightly packed. Hyphae of ring 3.0-10.7 μm diam. Hyphae of universal veil (stipe surface below ring) inflated, to 30.5 μm diam, without clamp connections, thin-walled, hyaline.

Spores (5.5)6.0-7.5 x 3.8-4.5 μm , ovoid to broadly ellipsoid; wall dark brown, 0.6 μm thick; apiculus minutely papillate, hyaline.

There are approximately five fruit bodies, all mature, all fragmented, in the type collection.

Schaeffer macrochemical reaction: negative.

Agaricus chlamydopus Peck. "1904" (1905). N.Y. State Mus. Bull. 94: 36.

≡ *A. cothurnatus* Peck. 1904. Bull. Torrey Bot. Club 31: 181. (non. *A. cothurnatus* Fries, Epicr. Sys. Myc., 1836-1838, p. 218).

TYPE SPECIMEN (holotype, implicit): NYS. Denver, Colo., 25.vii.02, coll. E. B. Sterling, det. C. H. Peck, s.n. (!)

Stature of carpophore campestroid; mature pileus convex, to 6 cm diam, cream when dried; surface smooth; dried flesh to 10 mm thick at disc, thinning at margin; margin involute. Lamellae (mature) deep chocolate brown, free, to 7 mm deep. Stipe equal, to 4.5 cm long, appearing fibrous, concolorous with the pileus when dried; ring existing as tufted upper edge of membranous, adherent volva.

Hyphae of pileus cuticle loosely interwoven, repent; pileocystidia few to lacking, to 7.5 μ m diam, unbranched; hyphae of pileus flesh 6.0-12.2 μ m diam, inflated, without clamp connections, thin-walled. Lamella trama irregular; hyphae 4.5-6.0 μ m diam, occasionally inflated; basidia 7.5-9.2 x 30.0 μ m, 4-sterigmate, without clamp connections; cheilocystidia clavate or irregularly clavate, single or fasciculate, to 4.5 μ m diam. Hyphae of stipe surface above volva 3.0-4.5 μ m diam, parallel, tightly packed. Hyphae of universal veil (pileus margin, volva) inflated, to 13.0 μ m diam, without clamp connections, thin-walled, hyaline.

Spores 7.0-9.2 x 7.5 μ m, subglobose to pyriform; lacking germ pore (SEM); wall dark brown, less than 0.6 μ m thick; apiculus papillate, hyaline.

The specimen consists of two mature fruit bodies.

Schaeffer macrochemical reaction: negative.

Agaricus cinchonensis Murrill. 1918. Mycologia 10: 76.

TYPE SPECIMEN (holotype, explicit): NY, Jamaica, 25.xii.08-8.i.09, coll. W. A. & E. L. Murrill, det. W. A. Murrill, no. 444. (!)

Stature of carpophore placomycetoid; mature pileus convex to plane, more or less umbonate, to 4 cm diam, chocolate brown when dried; surface fibrillose; dried flesh to 1 mm thick at disc, thinning to <1 mm at margin. Lamellae (mature) deep chocolate brown, free, to 3 mm deep. Stipe slightly bulbous, to 5 cm long, appearing fibrous, gray when dried; ring median where adhering to stipe, gold when dried.

Hyphae of pileus cuticle interwoven, repent; pileocystidia lacking; hyphae of pileus flesh 4.5-16.8 μ m diam, inflated, without clamp connections, thin-walled. Lamella trama irregular; hyphae 3.0-13.8 μ m diam, occasionally inflated; basidia 4.5-6.0 x 18.5-23.0 μ m, 4-sterigmate, without clamp connections; cheilocystidia scattered, sparse, napiform, to 9.2 μ m diam. Hyphae of stipe surface above ring 3.0-23.0 μ m diam, parallel, tightly packed. Hyphae of ring 2.3-9.2 μ m diam. Cells of universal veil (stipe surface below ring) inflated, to 30.5 μ m diam, without clamp connections, thin-walled, hyaline.

Spores 4.5-6.0 x 3.0-3.8 μm , broadly ellipsoid to ellipsoid; wall dark brown, 0.6 μm thick; apiculus minutely papillate or a hyaline spot in the spore wall.

The specimen contains five mature fruit bodies, a spore print, and brief notes written by Murrill.

Schaeffer macrochemical reaction: negative.

Agaricus ciscoensis Smith. "1939" (1940). Pap. Mich. Acad. Sci. Arts Lett. 25: 136-137.

TYPE SPECIMEN (holotype, explicit): MICH, Cisco, Texas, -.ix.35, coll. E. A. Smith, det. A. H. Smith, s.n. (!)

Stature of carpophore placomycetoid; pileus convex to plane, to 4 cm diam, brown when dried; surface silky-fibrillose, particularly on the disc; dried flesh 1 mm thick, thinning at margin. Lamellae (mature) deep chocolate brown, free, to 2 mm deep. Stipe equal to slightly bulbous, to 5 cm long, appearing fibrous, gray-tan when dried; ring superior, flaring, somewhat appendiculate, dull gold when dried.

Hyphae of pileus cuticle interwoven; pileocystidia abundant, 3.0-7.5 μm diam, usually unbranched, fasciculate or scattered; hyphae of pileus flesh 2.3-12.2 μm diam, slightly inflated, without clamp connections, thin-walled. Lamella trama irregular; hyphae 3.0-9.2 μm diam, occasionally inflated; basidia 6.0-7.0 x 13.8-16.8 μm , 4-sterigmate, without clamp connections; cystidia lacking. Hyphae of stipe surface above ring 3.0-10.7 μm diam, parallel, tightly packed. Hyphae of ring 3.0-10.7 μm diam. Cells of universal veil (stipe surface below ring) inflated, to 12.2 μm diam, without clamp connections, thin-walled, hyaline.

Spores 6.0-9.2 x 3.8-5.3 μm , broadly ellipsoid to more or less truncately ellipsoid; lacking germ pore (SEM); wall dark brown, 0.6 μm thick; apiculus indiscernible or minutely papillate, hyaline.

The type specimen consists apparently of several fruit bodies, although only one was made available for study.

Schaeffer macrochemical reaction: negative.

Agaricus citrinidiscus Murrill. 1945. Quart. J. Florida Acad. Sci. 8: 193.

TYPE SPECIMEN (holotype, explicit): FLAS, Gainesville, Fla., 11.viii.44, coll. & det. W. A. Murrill, no. 32719. (!)

Stature of carpophore placomycetoid; mature pileus plane, to 3.5 cm diam, dull tan with darker disc when dried; surface appearing glabrous; dried flesh to 2 mm thick at disc, thinning to <1 mm at margin. Lamellae (mature) deep chocolate brown, free, to 2 mm deep. Stipe bulbous, to 3.5 cm long, appearing fibrous, dull gold when dried.

Hyphae of pileus cuticle loosely interwoven, usually repent; pileocystidia loosely fasciculate, 3.0-6.0 μm diam, branched or unbranched; hyphae of pileus flesh 3.0-15.3 μm diam, occasionally inflated, without clamp connections, thin-walled. Lamella trama irregular; hyphae 6.0-15.3 μm diam, occasionally inflated; basidia not rehydrating on type material; cystidia lacking or also not rehydrating. Hyphae of stipe surface above ring 4.5-10.7 μm diam, parallel, tightly packed. Hyphae of ring 3.0-7.5 μm diam. Cells of universal veil (stipe surface below ring) inflated, to 23.0 μm diam, without clamp connections, thin-walled, hyaline.

Spores 4.5-6.0 x 3.8-4.5 μm , subglobose to broadly ellipsoid or ovoid; lacking germ pore (SEM); wall dark brown, 0.6 μm thick; apiculus indiscernible.

The specimen consists of a portion of one mature pileus and two stipes. There are also brief notes on the fresh condition written by Murrill.

Schaeffer macrochemical reaction: negative.

Agaricus comptuliformis Murrill. 1922. Mycologia 14: 203.

TYPE SPECIMEN (holotype, explicit): NY, Auburn, Ala. 29.vii.99, coll. F. S. Earle, det. W. A. Murrill, s.n. (!)

Stature of carpophore campestroid; mature pileus convex to expanded, to 3.5 cm diam, dull tan when dried; surface smooth; dried flesh to 3 mm thick at disc, thinning to <1 mm at margin. Lamellae (mature) deep chocolate brown, free, to 3 mm deep. Stipe equal, to 4 cm long, appearing fibrous, concolorous with pileus when dried; ring superior, dull gold when dried.

Hyphae of pileus cuticle loosely interwoven, usually repent; pileocystidia 2.3-4.5 μm diam, scattered, branched or unbranched; hyphae of pileus flesh 3.0-15.3 μm diam, inflated, without clamp connections, thin-walled. Lamella trama, basidia indiscernible on type material. Hyphae of stipe surface above ring 3.8-10.7 μm diam, parallel, tightly packed. Hyphae of ring 3.0-5.5 μm diam. Universal veil tissue absent on type material.

Spores 4.5-6.0 x 3.0-4.5 μm , ellipsoid to ovoid; wall dark brown, 0.6 μm thick; apiculus a hyaline spot in the spore wall.

The specimen consists of one immature fruit body plus numerous fragments of mature specimens.

Schaeffer macrochemical reaction: negative.

Agaricus comptuloides Murrill. 1912. Mycologia 4: 297.

TYPE SPECIMEN (holotype, explicit): NY, Seattle, Wash., 20.x.11-1.xi.11, coll. & det. W. A. Murrill, no. 434. (!)

Stature of carpophore placomycetoid; mature pileus conic to convex, umbonate, to 2 cm diam, golden brown when dried; surface slightly fibrillose-scaly; dried flesh to 1 mm thick at disc, thinning at margin. Lamellae (mature) deep chocolate brown, free, to 2 mm deep. Stipe bulbous, to 6 cm long, appearing fibrous, tan when dried; ring median to superior, gold when dried.

Hyphae of pileus cuticle interwoven, usually repent; pileocystidia loosely fasciculate, 3.0-6.0 μm diam, unbranched; hyphae of pileus flesh 3.0-18.5 μm diam, occasionally inflated, without clamp connections, thin-walled. Lamella trama irregular; hyphae 3.0-10.7 μm diam, occasionally inflated; basidia 6.0-7.5 x 16.8-18.5 μm , 4-sterigmate, without clamp connections; cystidia lacking. Hyphae of stipe surface above ring 6.0-15.3 μm diam, parallel, tightly packed. Hyphae of ring 3.0-5.5 μm diam. Cells of universal veil (stipe surface below ring) inflated, to 34.0 μm diam, without clamp connections, thin-walled, hyaline.

Spores 5.5-6.0 x 3.0-4.5 μm , broadly ellipsoid; wall dark brown, 0.6 μm thick; apiculus minutely papillate, hyaline.

The type specimen consists of two, mature, broken fruit bodies and an aquarelle by Murrill of a fresh specimen.

Schaeffer macrochemical reaction: negative.

Agaricus cothurnatus Peck. 1904. Torrey Bot. Club 31: 181. (non. *A. cothurnatus* Fries, Epicr. Sys. Myc., 1836-1838, p. 218.) see *A. chlamydopus* Peck.

Agaricus cretacellus Atkinson. 1902. J. Myc. 8: 110.

TYPE SPECIMEN (holotype, explicit): CUP, Cascadilla woods, Ithaca, N.Y., 7.ix.00, coll. & det. Geo. F. Atkinson, no. 5359. (!)

Stature of carpophore placomycetoid; mature pileus convex-expanded, to 6.5 cm diam, cream when dried; surface smooth; dried flesh to 2 mm thick at disc, thinning to <1 mm at margin. Lamellae (mature) deep chocolate brown, free, to 3 mm deep. Stipe bulbous, to 6.5 cm long, appearing fibrous; ring superior, cream when dried.

Hyphae of pileus cuticle loosely interwoven; pileocystidia lacking; hyphae of pileus flesh 3.8-13.8 μm diam, occasionally inflated, without clamp connections, thin-walled. Lamella trama irregular; hyphae 3.0-15.3 μm diam, occasionally inflated; basidia 5.5-6.0 x 16.8-21.5 μm , 4-sterigmate, without clamp connections; cheilocystidia lacking. Hyphae of stipe surface above ring 3.0-18.5 μm diam, parallel, tightly packed. Hyphae of ring 2.3-6.0 μm diam. Cells of universal veil (stipe surface below ring) inflated, to 23.0 μm diam, without clamp connections, thin-walled, hyaline.

Spores 5.5-6.0 x 3.0-3.8 μm , broadly ellipsoid to ovoid; wall dark brown, less than 0.6 μm thick; apiculus indiscernible.

The type collection contains approximately ten fruit bodies, three of which are whole. All specimens are mature.

Schaeffer macrochemical reaction: negative.

Agaricus cylindriceps Murrill. 1944. Lloydia 7: 323.

TYPE SPECIMEN (holotype, explicit): FLAS, Gainesville, 13.viii.37, coll. & det. W. A. Murrill, no. 16050. (!) Isotype: NY, no. F16050. (!)

Stature of carpophore campestroid; pileus cylindric to convex-truncate, to 4 cm diam, dull gray-gold when dried; surface minutely squamulose; dried flesh to 6 mm thick at disc, thinning to < 1 mm at margin; margin inrolled. Lamellae (mature) deep chocolate brown, free, to 3 mm deep. Stipe bulbous, to 6 cm long, appearing fibrous, tan when dried; ring median to superior, gold when dried.

Hyphae of pileus cuticle interwoven, usually repent; pileocystidia usually unbranched, fasciculate or scattered, to 6.0 μ m diam; hyphae of pileus flesh 4.5-12.2 μ m diam, occasionally inflated, without clamp connections, thin-walled. Lamella trama irregular; hyphae 1.5-4.5 μ m diam, uninflated or only slightly so; basidia 4.5-7.0 x 12.2-18.0 μ m, 4-sterigmate, without clamp connections; cystidia lacking. Hyphae of stipe surface above ring 3.0-12.2 μ m diam, parallel, tightly packed. Hyphae of ring 3.0-10.7 μ m diam. Hyphae of universal veil (stipe surface below ring) inflated, to 7.0 μ m diam, without clamp connections, thin-walled, hyaline.

Spores (5.3)6.0 x (3.8)4.5 μ m, ovoid to ellipsoid; lacking germ pore (SEM); wall dark brown, 0.6 μ m thick; apiculus indiscernible.

The type collection consists of ten immature fruit bodies, a sketch by Murrill and notes by him on the fresh condition of the specimens. The isotype contains fragments of two fruit bodies, one immature.

Schaeffer macrochemical reaction: negative.

Agaricus diminutivus Peck. 1873. Buffalo Soc. Nat. Sci. 1: 53.

TYPE SPECIMEN (holotype, implicit): NYS, Croghan, N.Y., -.ix.72, coll. & det. C. H. Peck, s.n., annot. A. H. Freeman, 1976. (!)

Stature of carpophore placomycetoid; mature pileus plane to slightly umbonate or depressed in center, to 1.5 cm diam, gray-tan when dried; surface spotted with appressed fibrillose scales; dried flesh to 1 mm thick at disc, thinning at margin. Lamellae (mature) deep chocolate brown, free, to 1 mm deep. Stipe to 3.5 cm long, slightly bulbous to equal, concolorous with pileus when dried; ring superior, thin, membranous, pale tan when dried.

Hyphae of pileus cuticle interwoven, repent; pileocystidia fasciculate, 4.5-6.0 μ m diam, unbranched; hyphae of pileus flesh 3.0-7.5 μ m diam, occasionally inflated, without clamp connections, thin-walled.

Lamella trama irregular; hyphae 3.0-4.5 μ m diam, inflated; basidia 4.5-6.0 x 13.8-15.3 μ m, 4-sterigmate, without clamp connections; cystidia lacking. Hyphae of stipe surface above ring 3.0-20.0 μ m diam, parallel, tightly packed. Hyphae of ring 3.0-4.5 μ m diam. Cells of universal veil (stipe surface below ring) inflated, to 14.0 μ m diam, without clamp connections, thin-walled, hyaline.

Spores 4.5-5.3 x 3.8 μ m, ellipsoid to ovoid or subglobose; lacking germ pore (SEM); wall dark brown, 0.6 μ m thick; apiculus papillate to barely discernible, hyaline.

The type collection of this taxon consists of four fruit bodies, all mature, and mounted on stiff paper. There is also included a color pencil sketch of a fruit body, apparently drawn by Peck.

Schaeffer macrochemical reaction: positive.

Agaricus earlei Murrill. 1918. *Mycologia* 10: 79.

TYPE SPECIMEN (holotype, explicit): NY, Cuba, 17.v.04, coll. F. S. Earle, det. W. A. Murrill, no. 33. (!)

Stature of carpophore placomycetoid; pileus ovoid to convex, then expanded, to 2.5 cm diam, dull gold with brownish disc and brown appressed fibrillose scales when dried; dried flesh to 1 mm thick at disc, thinning at margin. Lamellae (mature) deep chocolate brown, free, to 2 mm deep. Stipe bulbous, to 4 cm long, appearing fibrous, brown when dried; ring superior, brownish when dried.

Hyphae of pileus cuticle loosely interwoven; pileocystidia scattered or loosely fasciculate, 3.0-6.0 μ m diam, unbranched; hyphae of pileus flesh 4.5-16.8 μ m diam, inflated, without clamp connections; thin-walled. Lamella trama irregular; hyphae 3.0-6.0 μ m, uninflated or only slightly so; basidia 4.5-6.0 x 10.7-15.3 μ m, 4-sterigmate, without clamp connections; cystidia lacking. Hyphae of stipe surface above ring 4.5-21.5 μ m diam, parallel, tightly packed. Hyphae of ring 1.5-7.5 μ m diam. Cells of universal veil (stipe surface below ring) inflated, to 23.0 μ m diam, without clamp connections, thin-walled, hyaline.

Spores 4.5-5.5 x 3.0-3.8 μ m, broadly ellipsoid; wall dark brown, 0.6 μ m thick; apiculus indiscernible or a hyaline spot in the spore wall.

The type collection consists of approximately fifteen fruit bodies plus fragments; five of them are in the button stage.

Schaeffer macrochemical reaction: negative.

Agaricus eastlandensis Smith. 1944. *Mycologia* 36: 244.

TYPE SPECIMEN (holotype, explicit): MICH, Eastland, Texas, 28.viii.38, coll. E. A. Smith, det. A. H. Smith, s.n. (!)

Stature of carpophore placomycetoid; mature pileus convex to plane, to 1 cm diam, dull cream when dried; surface appressed silky-fibrillose; dried flesh less than 1 mm thick at disc. Lamellae (mature) deep

chocolate brown, free, 1 mm deep. Stipe bulbous, to 15.0 mm long, appearing fibrous, concolorous with pileus when dried; ring superior, cream when dried.

Hyphae of lamella trama 3.0-7.5 μm diam, occasionally slightly inflated; basidia 7.5-9.2 x 18.5-24.5 μm , 4-sterigmate, without clamp connections.

Spores 7.5-9.2 x 6.0-7.5 μm , broadly ellipsoid to subglobose; lacking germ pore (SEM); wall dark brown, 1.2 μm thick; apiculus minutely papillate, hyaline.

This description is incomplete because only one tiny fruit body was made available for study.

Schaeffer macrochemical reaction: negative.

Agaricus eludens Peck. 1910. N.Y. State Mus. Bull. 139: 42-43.

TYPE SPECIMEN (holotype, implicit): NYS, Trenton, N.J., 15.ix.08, coll. E. B. Sterling, det. C. H. Peck, s.n. (!)

Stature of carpophore placomycetoid; mature pileus ovate, broadly conic or subcampanulate, to 5.5 cm diam, dull gold when dried; surface except disc covered with brown appressed fibrillose scales; margin surpassing lamellae by 0.5 mm; dried flesh to 4 mm thick at disc, thinning to < 1 mm at margin. Lamellae (mature) deep chocolate brown, free, to 5 mm deep. Stipe equal to bulbous, to 8 cm long, appearing fibrous, concolorous with pileus when dried; ring superior, thick, membranous, gold when dried.

Hyphae of pileus cuticle loosely interwoven, usually repent; pileocystidia fasciculate, branched, to 12.0 μm diam; hyphae of pileus flesh 4.5-7.5 μm diam, usually uninflated, without clamp connections, thin-walled. Lamella trama irregular; hyphae 3.0-6.0(10.7) μm diam, occasionally inflated; basidia 6.0 x 15.3-20.0 μm , 4-sterigmate, without clamp connections; cystidia lacking. Hyphae of stipe surface above ring 4.5-13.8 μm diam, parallel, tightly packed. Hyphae of ring 3.0-6.0 μm diam. Cells of universal veil (stipe surface below ring) inflated, to 15.3 μm diam, without clamp connections, thin-walled hyaline.

Spores 5.3-6.0 x 3.0-3.8 μm , broadly ellipsoid to ovoid; wall dark brown, 0.6 μm thick; apiculus barely discernible, hyaline.

The type collection consists of approximately fifty fruit bodies, half of which are immature.

Schaeffer macrochemical reaction: negative.

Agaricus placomyces var. *flavescens* Thiers. 1959. Mycologia 51: 538.

TYPE SPECIMEN (holotype, explicit): MICH, Wellborn, Texas, 7.vi.52, coll. & det. H. D. Thiers, no. 1656. (!)

Stature of carpophore placomycetoid; pileus convex, broadly convex or obscurely broadly umbonate with age, to 12 cm diam, gray-gold when dried; surface covered with appressed to slightly recurved fibrillose scales; dried flesh to 4 mm thick at disc, thinning to < 1 mm at margin; margin projecting 1-2 mm. Lamellae (mature) deep chocolate brown, free, to 1 mm deep. Stipe slightly bulbous, concolorous with pileus when dried; ring superior, gold when dried.

Hyphae of pileus flesh 3.0-13.8 μ m diam, inflated, without clamp connections, thin-walled. Lamella trama irregular; hyphae 3.0-6.0 μ m diam, uninflated; basidia 6.0-8.0 x 15.0-20.0 μ m, sterigmata not found, without clamp connections; cheilocystidia catenulate, consisting of globose to pyriform cells, to 9.2 μ m diam, scattered. Hyphae of ring 3.0-7.5 μ m diam. Universal veil tissue absent on type material.

Spores 4.5-6.2 x 2.8-3.5 μ m, ellipsoid to subovoid, lacking germ pore (SEM).

This description is incomplete because adequate material was not furnished for examination.

Schaeffer macrochemical reaction: negative.

Agaricus floridanus Peck. 1911. N.Y. St. Mus. Bull. 495: 50.

TYPE SPECIMEN (holotype, implicit): NYS, DeFuniak Springs, Fla., 29.iii.10, coll. G. Clyde Fisher, det. C. H. Peck, s.n. (!) Isotype: FLAS, no. 45919. (!)

Stature of carpophore campestroid; pileus campanulate, expanded to plane, to 8 cm diam, dull gray-gold when dried; surface rimose-areolate to slightly strigose or glabrous; dried flesh to 1 cm thick at disc, thinning to < 1 mm at margin. Lamellae (mature) deep chocolate brown, free, to 4 mm deep. Stipe equal to bulbous, to 5 cm long, appearing fibrous, concolorous with pileus when dried; ring superior, appendiculate on young specimens, dull gray-gold when dried.

Hyphae of pileus cuticle loosely interwoven, usually repent; pileocystidia lacking; hyphae of pileus flesh 9.2-20.0 μ m diam, inflated, without clamp connections, thin-walled. Lamella trama irregular; hyphae 2.3-4.6 μ m diam, uninflated; basidia 6.0-7.5 x 15.3-24.5 μ m, 4-sterigmate, without clamp connections; cheilocystidia napiform, scattered, 12.2-18.5 μ m diam, thin-walled. Hyphae of stipe surface above ring 3.0-9.2 μ m diam, parallel, tightly packed. Hyphae of ring 3.0-10.7 μ m diam. Cells of universal veil (stipe surface below ring) inflated, to 15.3 μ m diam, without clamp connections, thin-walled, hyaline.

Spores 6.0-7.5 x 4.5-5.3 μ m, broadly ellipsoid to ovoid; lacking germ pore (SEM); wall dark brown, 0.6 μ m thick; apiculus minute to indiscernible, hyaline.

The type collection contains seventeen fruit bodies, four of these immature. There are also notes by Peck on the fresh condition of the

specimens. The isotype consists of one immature specimen plus pileus fragments.

Schaeffer macrochemical reaction: negative.

Agaricus glabrus Zeller. 1938. *Mycologia* 30: 469-470.

TYPE SPECIMEN (holotype, explicit): NY, Pacific Grove, Calif., 1.ii.37, coll. G. S. Burlingham, det. S. M. Zeller, no. 11532. (!)

Stature of carpophore placomycetoid; pileus subconical to expanded, subumbonate, to 10 cm diam, gray-brown when dried; surface covered with delicate innate brown fibrils; dried flesh to 3 mm thick at disc, thinning to < 1 mm at margin. Lamellae (mature) deep chocolate brown, free, to 4 mm deep. Stipe bulbous, to 9 cm long, appearing fibrous, concolorous with pileus when dried; ring superior, lower portion more or less cottony, upper portion smooth, dull gold when dried.

Hyphae of pileus cuticle loosely interwoven; pileocystidia scattered, 3.0-6.0 μ m diam, branched or unbranched; hyphae of pileus flesh 4.5-16.8 μ m diam, usually inflated, without clamp connections, thin-walled. Lamella trama irregular; hyphae 3.8-9.2(13.8) μ m diam, occasionally inflated; basidia 5.5-6.0 x 20.0-21.5 μ m, 4-sterigmate, without clamp connections; cystidia lacking. Hyphae of stipe surface above ring 7.5(27.5) μ m diam, parallel, tightly packed. Hyphae of ring 3.0-7.5 μ m diam. Cells of universal veil (stipe surface below ring) inflated, to 20.0 μ m diam, without clamp connections, thin-walled, hyaline.

Spores (4.5)5.5-6.0 x 3.8 μ m, broadly ellipsoid; wall dark brown, 0.6 μ m thick; apiculus minutely papillate, hyaline or indiscernible.

The type collection consists of nine mature fruit bodies.

Schaeffer macrochemical reaction: negative.

Agaricus halophilus Peck. "1904" (1905). N.Y. State Mus. Bull. 94: 36

$\equiv$ *A. maritimus* Peck. 1899. Bull. Torrey Bot. Club 26: 66.
(non *A. maritimus* Fries. Syst. Myc. I: 198).

TYPE SPECIMEN (holotype, implicit): NYS, Lynn. Mass., -.xi.-, coll. R. F. Dearborn, det. C. H. Peck, s.n. (!)

Stature of carpophore campestroid; pileus at first subglobose, then convex to plane, to 6 cm diam, dull gold when dried; surface smooth to somewhat fibrillose; dried flesh to 1.5 cm thick at disc, thinning to 1 mm at margin. Lamellae (mature) deep chocolate brown, free, to 3-4 mm deep. Stipe tapering downward, to 3 cm long, appearing fibrous, concolorous with pileus when dried; ring median to superior, upstanding, dull gold when dried.

Hyphae of pileus cuticle tightly interwoven, repent; pileocystidia lacking; hyphae of pileus flesh 12.2-18.5 μm diam, inflated, without clamp connections, thin-walled. Lamella trama irregular; hyphae 3.0-4.5 μm diam, uninflated; basidia 4.5-7.5 x 23.0-46.0 μm , 4-sterigmate, without clamp connections; cystidia lacking. Hyphae of stipe surface above ring 4.5-7.5 μm diam, parallel, tightly packed. Hyphae of ring 3.0-6.0 μm diam. Hyphae of universal veil (stipe surface below ring, ring margin) inflated, to 10.7 μm diam, without clamp connections, thin-walled, hyaline.

Spores 6.0-7.5 x 5.3-6.0 μm , subglobose; wall dark brown, less than 0.6 μm thick; apiculus minutely papillate, hyaline.

Schaeffer macrochemical reaction: negative.

Note: This is considered an implicit holotype because it is the only collection under this name among the Peck specimens and because its collection site and collector coincide with the data in the original description. The collection consists of six fruit bodies, including four immature specimens, plus fragments.

Agaricus hondensis Murrill. 1912. Mycologia 4: 296-297.

TYPE SPECIMEN (holotype, explicit): NY, LaHonda, Calif., 25.xi.11, coll. W. A. Murrill & L. S. Abrams, det. W. A. Murrill, no. 1260. (!)

Stature of carpophore placomycetoid; mature pileus convex to plane or depressed, to 4.5 cm diam, tan with brown disc when dried; surface smooth; dried flesh to 4 mm thick at disc, thinning to <1 mm at margin. Lamellae (mature) deep chocolate brown, free, to 2 mm deep. Stipe bulbous, to 8 cm long, appearing fibrous, concolorous with pileus when dried; ring superior, gold when dried.

Hyphae of pileus cuticle tightly interwoven, repent; pileocystidia lacking; hyphae of pileus flesh 3.8-15.3 μm diam, occasionally inflated, without clamp connections, thin-walled. Lamella trama irregular; hyphae 3.0-15.3 μm diam, occasionally inflated; basidia 4.5 x 12.2-15.3 μm , 4-sterigmate, without clamp connections; cystidia lacking. Hyphae of stipe surface above ring 3.8-12.2 μm diam, parallel, tightly packed. Hyphae of ring 3.0-7.5 μm diam. Cells of universal veil (pileus margin, stipe surface below ring) inflated, to 23.0 μm diam, without clamp connections, thin-walled, hyaline.

Spores (4.5)5.5-6.0 x 3.8-4.5 μm , subglobose to ovoid; wall dark brown, 0.6 μm thick; apiculus minutely papillate, hyaline.

The type collection contains one mature fruit body and brief notes by Murrill.

Schaeffer macrochemical reaction: negative.

Agaricus johnstonii Murrill. 1918. Mycologia 10: 75.

TYPE SPECIMEN (lectotype, *des. mihi*): NY, Rio Piedras, P.R., 12.xii.15, coll. J. R. Johnston, det. W. A. Murrill, no. 3485. (!)

Stature of carpophore placomycetoid; mature pileus expanded, 3.5 cm diam, brown, almost black on disc when dried; surface squamulose; dried flesh to 2 mm thick at disc, thinning to <1 mm at margin. Lamellae (mature) deep chocolate brown, free, to 3 mm deep. Stipe equal, appearing fibrous, concolorous with pileus when dried; ring absent on type material.

Hyphae of pileus cuticle tightly interwoven, usually repent; pileocystidia fasciculate, 3.0-7.5 μ m diam, unbranched; hyphae of pileus flesh 3.0-13.8 μ m diam, occasionally inflated, without clamp connections, thin-walled. Lamella trama irregular; hyphae 2.3-6.0 μ m diam, uninflated or only slightly so; basidia indiscernible; cystidia indiscernible. Hyphae of stipe surface near pileus 3.0-10.7 μ m diam, parallel, tightly packed. Hyphae of ring absent. Cells of universal veil (stipe surface near base) inflated, to 15.3 μ m diam, without clamp connections, thin-walled, hyaline.

Spores (3.8)4.5-6.0 x 3.0 μ m, ellipsoid; wall dark brown, 0.6 μ m thick; apiculus a hyaline spot in the spore wall.

Schaeffer macrochemical reaction: negative.

Note: As the original type of this taxon is in fragments and beyond any recognition, I have established this collection, mentioned in Murrill's original description of the taxon, as a lectotype. The collection contains a single, mature fruit body.

Agaricus kauffmanii Smith. "1939" (1940). Pap. Mich. Acad. Sci. Arts Lett. 25: 126-127.

TYPE SPECIMEN (holotype, explicit): MICH, Takoma Park, Md., 22.vii.19, coll. C. H. Kauffman, det. A. H. Smith, s.n. (!)

Stature of carpophore placomycetoid; pileus dark tan to brown when dried; surface covered with appressed fibrillose scales; dried flesh to 1 mm thick at disc, thinning at margin. Lamellae (mature) deep chocolate brown, free, to 1 mm deep. Stipe more or less bulbous, to 9 cm long, fibrous, dark tan when dried; ring absent on type material.

Hyphae of pileus cuticle interwoven, usually repent; pileocystidia abundant, usually unbranched, 3.0-9.2 μ m diam; hyphae of pileus flesh 3.0-13.8 μ m diam, slightly inflated, without clamp connections, thin-walled. Lamella trama irregular; hyphae 1.5-3.8 μ m diam, uninflated; basidia 7.5 x 18.5-24.5 μ m, 4-sterigmate, without clamp connections; cystidia lacking. Hyphae of stipe surface near pileus 3.0-10.7 μ m diam, parallel, tightly packed. Hyphae of ring absent on type material. Cells of universal veil (stipe surface near base) inflated, to 18.5 μ m diam, without clamp connections, thin-walled, hyaline.

Spores 5.5-6.0 x 3.8-4.5 μ m, broadly ellipsoid to subglobose; lacking germ pore (SEM); wall dark brown, 0.6 μ m thick; apiculus minutely papillate, hyaline.

This description is incomplete because only a portion of the type collection was made available for study.

Schaeffer macrochemical reaction: negative.

Agaricus lilaceps Zeller. 1938. *Mycologia* 30: 470-471.

TYPE SPECIMEN (holotype, explicit): NY, Pacific Grove, Calif., 12.ii.35, coll. G. S. Burlingham, det. S. M. Zeller, no. 9009. (!)

Stature of carpophore campestroid; mature pileus hemispheroid to convex-expanded, to 6.5 cm diam, golden tan when dried; surface smooth to more or less fibrillose; dried flesh to 5 mm thick at disc, thinning to < 1 mm at margin; margin projecting somewhat. Lamellae (mature) deep chocolate brown, free, to 3 mm deep. Stipe subequal to more or less bulbous, to 5.5 cm long, appearing fibrous, gold when dried; ring somewhat appendiculate, superior when adhering to stipe, gold when dried.

Hyphae of pileus cuticle loosely interwoven; pileocystidia scattered, 4.5-10.7 μ m diam, branched or unbranched; hyphae of pileus flesh 4.5-20.0 μ m diam, usually inflated, without clamp connections, thin-walled. Lamella trama irregular; hyphae 3.8-15.3 μ m diam, usually inflated; basidia 6.0 x 21.5-26.0 μ m, 4-sterigmate, without clamp connections; cheilocystidia clavate, subnapiform or slightly capitulate, to 7.5 μ m diam, extending beyond hymenium to 20.0 μ m. Hyphae of stipe surface above ring 3.0-23.0 μ m diam, parallel, tightly packed. Hyphae of ring 3.0-12.2 μ m diam. Hyphae of universal veil (stipe surface below ring) uninflated or only slightly so, 3.0-9.2 μ m diam, without clamp connections, thin-walled, hyaline.

Spores 5.5-6.0(7.0) x 4.5 μ m, subglobose to ovoid; wall dark brown, 0.6 μ m thick; apiculus indiscernible or a hyaline spot in the spore wall.

The type collection contains four fruit bodies, including one immature specimen, and notes on the fresh condition.

Schaeffer macrochemical reaction: positive.

Agaricus magniceps Peck. "1904" (1905). N.Y. State Mus. Bull. 94: 36.

= *A. magnificus* Peck. 1899. Bull. Torrey Bot. Club 26: 67.
(non *A. magnificus* Fries. 1874. Hymen. Eur. p. 25).

TYPE SPECIMEN (holotype, implicit): NYS Mt. Gretna, Pa., -.viii.98, coll. McIlvaine, det. C. H. Peck, s.n. (!)

Stature of carpophore robustly placomycetoid; pileus dull brown-gold when dried; surface glabrous. Lamellae (mature) deep chocolate brown, free, to 5 mm deep. Stipe bulbous, to 10.5 cm long, appearing fibrous, concolorous with pileus when dried; ring median, draping, adherent, dull gold when dried.

Hyphae of pileus cuticle loosely interwoven, repent; pileocystidia lacking; hyphae of pileus flesh 3.0-12.2 μ m diam, inflated, without clamp connections, thin-walled. Lamella trama, basidia, cystidia impossible to discern. Hyphae of stipe surface above ring 7.5-12.2 μ m diam, parallel, tightly packed. Hyphae of ring 3.0-10.7 μ m diam. Cells of universal veil (stipe surface below ring) inflated, to 30.5 μ m diam, without clamp connections, thin-walled, hyaline.

Spores 5.3-7.5 x 3.0-4.5 μ m, ellipsoid to broadly ellipsoid or ovoid; wall dark brown, 0.6 μ m thick; apiculus minutely papillate, hyaline.

Schaeffer macrochemical reaction: negative.

Note: This is considered an implicit holotype because it is the only collection under this name among the Peck specimens and because its date, collection site and collector coincide with data in the original description. The collection consists of a single mature fruit body, badly broken up.

Agaricus magnificus Peck. 1899. Bull. Torrey Bot. Club 26: 67. non *A. magnificus* Fries. 1874. Hymen. Eur. p. 25. See *A. magniceps* Peck.

Agaricus campestris var. *majusculus* Peck. 1912. N.Y. State Mus. Bull. 157: 57-58, 106.

TYPE SPECIMEN (holotype, implicit): NYS, Schenectady, N.Y., -x.11, coll. Mrs. G. E. Duryee, det. C. H. Peck, s.n. (!)

Stature of carpophore campestroid; pileus convex, expanded to plane, to 11 cm diam, dull tan when dried; surface covered with brown, silky fibrillose scales; dried flesh to 4 mm thick at disc, thinning to < 1 mm at margin; margin slightly surpassing lamellae. Lamellae (mature) deep chocolate brown, free, to 5 mm deep. Stipe equal, to 6 cm long, brown when dried; ring median, dull gold when dried.

Hyphae of pileus cuticle interwoven, usually repent; pileocystidia fasciculate or scattered, 3.0-6.0 μ m diam, usually unbranched; hyphae of pileus flesh 4.5-23.0 μ m diam, usually highly inflated, without clamp connections, thin-walled. Lamella trama irregular; hyphae 2.3-9.2 μ m diam, uninflated or only slightly so; basidia 5.5-7.5 x 15.3-18.5 μ m, 2-sterigmate, without clamp connections; cheilocystidia broadly clavate to napiform, 9.2-12.2 μ m diam, scattered. Hyphae of stipe surface above ring 6.0-30.0 μ m diam, parallel, tightly packed. Hyphae of ring 3.8-10.7 μ m diam. Cells of universal veil (stipe surface below ring) variously inflated, to 29.0 μ m diam, without clamp connections, thin-walled, hyaline.

Spores 6.0-7.5 x 4.5-6.0 μ m, subglobose; wall dark brown, 0.6 μ m thick; apiculus indiscernible or minutely papillate, hyaline.

Schaeffer macrochemical reaction: negative.

Note: This is considered an implicit holotype because its collection site, collector and date coincide with the data given in

Peck's original description of the taxon. I feel this taxon is clearly distinct from *A. campestris* in several respects: *A. majusculus* exhibits cellular universal veil tissue, 2-sterigmate basidia and is brown in the fresh condition, whereas *A. campestris* has hyphal universal veil tissue, 4-sterigmate basidia and white (or brownish from fibrils) coloration. For these reasons, *A. campestris* var. *majusculus* should be considered a distinct species. I retain Peck's varietal name raised to species rank in acknowledgement of his recognition of the taxon.

Agaricus maritimus Peck. 1899. Bull. Torrey Bot. Club 26: 66. non *A. maritimus* Fries. Syst. Myc. I: 198. See *A. halophilus* Peck.

Agaricus micromegethus Peck. "1904" (1905) N.Y. State Mus. Bull.

≡ *A. pusillus* Peck. 1900. N.Y. State Mus. Rep. p. 152. (non *A. pusillus* Pers. per Fries. 1821. Syst. Myc. 1: 279; bas. *Amanita pusilla* Pers. 1797. Obs. Mycol. 2: 36).

TYPE SPECIMEN (lectotype, *des. mihi*): NYS, Delhi, N.Y., no date, coll. S. Sherwood, det. C. H. Peck. s.n. (!)

Stature of carpophore campestroid; pileus convex to plane, to 3 cm diam, occasionally depressed in center, golden tan with somewhat darker disc when dried; surface silky fibrillose with brown appressed fibrillose scales; dried flesh to 4 mm thick at disc, thinning to 0.5 mm at margin. Lamellae (mature) deep chocolate brown, free, 2-4 mm deep. Stipe equal to slightly bulbous, to 3 cm long, appearing fibrous, concolorous with pileus when dried; ring appendiculate, median when adhering to stipe, pale gold when dried.

Hyphae of pileus cuticle interwoven, repent; pileocystidia fasciculate or single, rarely branched, to 5.3 μ m diam; hyphae of pileus flesh 4.5-13.8 μ m diam, usually inflated, without clamp connections, thin-walled. Lamella trama irregular; hyphae 1.5-4.5 μ m diam, uninflated; basidia 3.8-6.0 x 10.7-15.3 μ m, 4-sterigmate, without clamp connections; cystidia lacking. Hyphae of stipe surface above ring 6.0-9.2 μ m diam, parallel, tightly packed. Hyphae of ring 3.0-4.5 μ m diam. Cells of universal veil (stipe surface below ring) inflated, to 15.3 μ m diam, without clamp connections, thin-walled, hyaline.

Spores 4.5-6.0 x 3.0-4.5 μ m, broadly ellipsoid to subglobose; wall dark brown, 0.6 μ m thick; apiculus minutely papillate hyaline to indiscernible.

Schaeffer macorchemical reaction: negative.

Note: In Peck's original description he made reference to the fact that the description was based on Delhi specimens plus specimens in Detroit. Because he cites collection data matching that of the Delhi specimens I have established these specimens as a lectotype. The type consists of nine fruit bodies including two immature forms.

Agaricus placomyces var. *microsporus* Smith. "1939" (1940).
Pap. Mich. Acad. Sci. Arts Lett. 25: 125-126.

TYPE SPECIMEN (holotype, explicit): MICH, Smith River, Cal.,
16.xi.37, coll. & det. A. H. Smith, no. 8800. (!)

Stature of carpophore placomycetoid; mature pileus expanded to plane, white, darker on the disc, with gray fibrils when dried; dried flesh to 2 mm thick at disc, thinning to <1 mm at margin. Lamellae (mature) deep chocolate brown, free, to 2 mm deep. Stipe bulbous, to 7 cm long, dull tan when dried; ring superior, dull gold when dried.

Hyphae of pileus cuticle interwoven, usually repent; pileocystidia fasciculate, unbranched, 4.5-7.5 μ m diam, grayish; hyphae of pileus flesh 4.5-20.0 μ m diam, occasionally inflated, without clamp connections, thin-walled. Lamella trama irregular; hyphae 3.0-9.2 μ m diam, uninflated or only slightly so; basidia 5.3-6.0 x 12.2-23.0 μ m, 4-sterigmate, without clamp connections; cystidia lacking. Hyphae of stipe surface above ring 3.0-9.2 μ m diam, parallel, tightly packed. Hyphae of ring 3.0-12.2 μ m diam. Cells of universal veil (stipe surface below ring) inflated, to 23.0 μ m diam, without clamp connections, thin-walled, hyaline.

Spores 4.5-6.0 x 3.0-3.8 μ m, ellipsoid; lacking germ pore (SEM); wall dark brown, 0.6 μ m thick; apiculus papillate, hyaline.

Only a portion of the type material was made available for study.

Schaeffer macrochemical reaction: negative.

Agaricus ochraceidiscus Murrill. 1918. *Mycologia* 10: 80.

TYPE SPECIMEN (holotype, explicit): NY, Cuba, 28.ix.04, coll.
F. S. Earle, det. W. A. Murrill, no. 265. (!)

Stature of carpophore placomycetoid; mature pileus convex to expanded, to 6.5 cm diam, dull gold with tan disc and tan fibrillose scales when dried; dried flesh to 5 mm thick at disc, thinning to <1 mm at margin. Lamellae (mature) deep chocolate brown, free, to 3 mm deep. Stipe slightly bulbous, to 5 cm long, appearing fibrous, golden tan when dried; ring superior, somewhat appendiculate, gold when dried.

Hyphae of pileus cuticle interwoven, usually repent; pileocystidia loosely fasciculate, 1.5-4.5 μ m diam, unbranched; hyphae of pileus flesh 3.0-12.2 μ m diam, inflated, without clamp connections, thin-walled. Lamella trama irregular; hyphae 3.0-9.2 μ m diam, uninflated or only slightly so; basidia 6.0-7.5 x 13.8-15.3 μ m, 4-sterigmate, without clamp connections; cheilocystidia scattered, napiform or broadly clavate, to 9.2 μ m diam. Hyphae of stipe surface above ring 3.0-9.2 μ m diam, parallel, tightly packed. Hyphae of ring 2.3-6.0 μ m diam. Cells of universal veil (stipe surface below ring) inflated, to 29.0 μ m diam, without clamp connections, thin-walled, hyaline.

Spores 4.5-6.0 x 3.8-4.5 μ m, broadly ellipsoid; wall dark brown, 0.6 μ m thick; apiculus indiscernible or a hyaline spot in the spore wall.

The type collection consists of six fruit bodies, all mature, plus fragments and brief notes by Murrill.

Schaeffer macrochemical reaction: negative.

Agaricus arvensis var. *palustris* Smith. "1939" (1940).
Pap. Mich. Acad. Sci. Arts Lett. 25: 117-118.

TYPE SPECIMEN (holotype, explicit): MICH, Kent Lake, Mich.,
13.ix.37, coll. & det. A. H. Smith, s.n. (!)

Stature of carpophore placomycetoid; mature pileus broadly umbonate to plane, uniformly gold when dried; surface appressed silky fibrillose; dried flesh to 6 mm thick at disc, thinning to <1 mm at margin. Lamellae (mature) deep chocolate brown, free, to 2 mm deep. Stipe bulbous, appearing fibrous, gray-gold when dried; ring superior, gray-gold when dried.

Hyphae of pileus cuticle loosely interwoven; pileocystidia 3.0-6.0 μ m diam, scattered, branched; hyphae of pileus flesh 4.5-15.3 μ m diam, inflated, without clamp connections, thin-walled. Lamella trama irregular; hyphae 3.0-20.0 μ m diam, inflated; basidia 7.5 x 20.0-24.5 μ m, 4-sterigmate, without clamp connections; cheilocystidia broadly clavate to napiform, 7.5-17.5 μ m diam, fasciculate or forming a sterile band along entire gill edge. Hyphae of stipe surface above ring 4.5-16.8 μ m diam, parallel, tightly packed. Hyphae of ring 3.0-3.8 μ m diam. Cells of universal veil (lower surface of ring) inflated, to 15.3 μ m diam, without clamp connections, thin-walled, hyaline.

Spores 7.5-9.2 x (4.5)5.3(6.0) μ m, ovoid to pyriform; lacking germ pore (SEM); wall dark brown, 0.6 μ m thick; apiculus minutely papillate, hyaline.

Only a portion of the type material was made available for study.

Schaeffer macrochemical reaction: negative.

Agaricus pattersonae Peck. 1907. Bull. Torrey Bot. Club
34: 347.

TYPE SPECIMEN (holotype, implicit): NYS, Stanford University,
Stanford, Calif., -i.07, coll. Miss A. M. Patterson, det. C. H. Peck,
s.n. (!)

Stature of carpophore campestroid; mature pileus convex to plane, to 4.5 cm diam, dull tan to chocolate brown when dried; surface covered with brown appressed fibrillose scales; dried flesh to 3 mm thick at disc, thinning to <1 mm at margin. Lamellae (mature) deep chocolate brown, free, to 3 mm deep. Stipe bulbous, to 6.5 cm long, appearing fibrous, concolorous with pileus when dried; ring two-limbed, superior, more or less appendiculate, flaring, dull gray-tan when dried.

Hyphae of pileus cuticle interwoven, repent; pileocystidia fasciculate, unbranched, to 7.5 μ m diam; hyphae of pileus flesh to 9.2 μ m

diam, inflated, without clamp connections, thin-walled. Lamella trama irregular; hyphae 3.0-4.5 μm diam, uninflated; basidia 7.5-10.0 x 24.5-39.8 μm , 4-sterigmate, without clamp connections; cystidia lacking. Hyphae of stipe surface above ring to 10.7 μm diam, parallel, tightly packed. Hyphae of ring 4.5-10.7 μm diam. Cells of universal veil (stipe surface below ring) inflated, to 30.5 μm diam, without clamp connections, thin-walled, hyaline.

Spores 7.5 x 6.0 μm , subglobose to ovoid; wall dark brown, 0.6 μm thick; apiculus papillate, hyaline.

Schaeffer macrochemical reaction: negative.

Note: This is considered an implicit holotype because it is the only collection under this name among the Peck specimens and because its date, collection site and collector coincide with the data in the original description. The collection contains one mature and one immature fruit body plus fragments, a spore print, and two black and white photos.

Agaricus pilosporus Peck. "1904" (1905). N.Y. State Mus. Bull. 94: 36.

≡ *A. sphaerosporus* Peck. 1904. Bull. Torrey Bot. Club 31: 181. (non *A. sphaerosporus* Krombholz. 1836. Naturgetreue Abbildungen u. Beschreibungen der Essbaren, Schädlichen u. Verdächtigen Schwämme. Viertes Heft. Prag. p. 10).

TYPE SPECIMEN (holotype, implicit): NYS, Denver, Colo., 7.vi.02, coll. E. B. Sterling, det. C. H. Peck, s.n. (!)

Stature of carpophore campestrid; mature pileus convex, occasionally depressed in the center, to 12 cm diam, pale gold when dried; surface rimose to a depth of 2 mm; dried flesh to 1 cm thick at disc, thinning to 1 mm at margin; margin incurved. Lamellae (mature) deep chocolate brown, free, to 4 mm deep. Stipe equal, to 10 cm long, appearing fibrous, concolorous with pileus when dried; ring superior, flaring, membranous, more or less appendiculate, cream to pale tan when dried.

Hyphae of pileus cuticle loosely interwoven, repent; pileocystidia lacking; hyphae of pileus flesh 3.0-13.8 μm diam, occasionally inflated, without clamp connections, thin-walled. Lamella trama irregular; hyphae 3.0-6.0 μm diam, occasionally inflated; basidia 6.0-7.5 x 24.5-29.0 μm , 4-sterigmate, without clamp connections; cystidia lacking. Hyphae of stipe surface above ring 4.5-10.7 μm diam, parallel, tightly packed. Hyphae of ring 3.0-6.0 μm diam. Hyphae of universal veil (stipe surface below ring, ring margin) to 15.0 μm diam, inflated, with spathulate tips and intercalary inflations, without clamp connections, thin-walled, hyaline.

Spores 6.0-7.5 x 6.0-7.5 μm , subglobose; lacking germ pore (SEM); wall dark brown, 0.6 μm thick; apiculus minute to barely discernible, hyaline.

Schaeffer macrochemical reaction: negative.

Note: This is considered an implicit holotype because it is the only collection under this name among the Peck specimens and because its date, collection site, and collector coincide with the data in the original description. The collection consists of six fruit bodies plus fragments; one of the six is an immature form.

Agaricus placomyces Peck. 1878. N.Y. State Mus. Nat. Hist. 29: 40.

TYPE SPECIMEN (holotype, implicit): NYS. Knowersville and Oneida, N.Y., no date, coll. & det. C. H. Peck, s.n. (!) Isotype: NCU, s.n. (!)

Stature of carpophore placomycetoid; pileus convex expanded to plane, to 8 cm diam, dull gray-brown when dried; surface covered with appressed, fibrillose scales; dried flesh to 1 mm thick at disc, thinning at margin. Lamellae (mature) deep chocolate brown, free, to 5 mm deep. Stipe bulbous, appearing fibrous, dull tan to gray when dried; ring superior, gray-tan to brown when dried.

Hyphae of pileus cuticle tightly interwoven, repent; pileocystidia fasciculate, unbranched, to 7.5 μ m diam, golden brown; hyphae of pileus flesh 4.5-18.5 μ m diam, occasionally inflated, without clamp connections, thin-walled. Lamella trama irregular; hyphae 3.0-4.5 μ m diam, uninflated or only slightly so; basidia 6.0 x 12.2-20.0 μ m, 4-sterigmate, without clamp connections; cystidia lacking. Hyphae of stipe surface above ring 6.0-9.2 μ m diam, parallel, tightly packed. Hyphae of ring 3.0-7.5 μ m diam. Cells of universal veil (stipe surface below ring) inflated, to 23.0 μ m diam, without clamp connections, thin-walled, hyaline.

Spores 4.5-6.0 x 3.0-3.8 μ m, ellipsoid to ovoid; wall dark brown, 0.6 μ m thick; apiculus papillate, hyaline.

Schaeffer macrochemical reaction: negative.

Note: This is considered an implicit holotype because it is the only collection under this name among the Peck specimens and because its collection site and collector coincide with the data given in the original description. The two collection sites indicate a mixed collection; however, Guzmair attempted to separate the Knowersville and Oneida specimens, but there was nothing to indicate that this was possible. I have therefore considered the mixed collection, consisting of many pieces which seem to be quite homogeneous, as a single collection and an implicit type.

Agaricus pocillator Murrill. 1941. Mycologia 33: 446-447.

TYPE SPECIMEN (holotype, explicit): FLAS, Gainesville, Fla., 4.vi.38, coll. & det. W. A. Murrill, no. 16476. (!) Isotypes: NY, no. 16476. (!); NCU, s.n. (!); BPI, s.n. (!)

Stature of carpophore placomycetoid; mature pileus plane, depressed in center, to 6 cm diam, dull gray-tan, somewhat darker on the disc when dried; dried flesh to 3 mm thick at disc, thinning to < 1 mm at margin. Lamellae (mature) deep chocolate brown, free, to 3 mm deep. Stipe bulbous to cupulate at base, to 8 cm long, appearing fibrous, dull brown when dried; ring superior, conspicuously double, the lower portion rounding up into a discrete partial veil, the upper portion (marginal veil) stretching across the lamellae in youth, thin, membranous, brown when dried.

Hyphae of pileus cuticle interwoven, usually repent; pileocystidia loosely fasciculate or scattered, 3.0-6.0 μm diam, unbranched; hyphae of pileus flesh 3.0-15.3 μm diam, occasionally inflated, without clamp connections, thin-walled. Lamella trama irregular; hyphae 2.3-4.5 μm diam, uninflated; basidia 4.5-6.0 x 10.7-15.3 μm , 4-sterigmate, without clamp connections; cystidia lacking. Hyphae of stipe surface above ring 3.0-11.5 μm diam, parallel, tightly packed. Hyphae of ring 2.3-6.0 μm diam. Cells of universal veil (stipe surface below ring) inflated, to 21.5 μm diam, without clamp connections, thin-walled, hyaline.

Spores 4.5-6.0 x 3.0-3.8 μm , ellipsoid to broadly ellipsoid; wall dark brown, less than 0.6 μm thick; apiculus papillate, hyaline.

The type collection consists of six fruit bodies, three of which are immature.

Schaeffer macrochemical reaction: negative.

Agaricus praemagniceps Murrill. 1938. J. Elisha Mitchell Sci. Soc. 54: 140.

TYPE SPECIMEN (holotype, explicit): FLAS, Gainesville, Fla., 15.viii.37, coll. & det. W. A. Murrill, no. 16051. (!)

Stature of carpophore campestroid; mature pileus convex, depressed over disc, to 8 cm diam, gray-gold, brown on disc when dried; surface smooth with the exception of minute fibrils on the disc; dried flesh to 7 mm thick around the depressed disc, thinning to < 1 mm at margin; margin more or less inrolled. Lamellae (mature) deep chocolate brown, free, to 5 mm deep. Stipe bulbous, to 6.5 cm long, appearing fibrous, concolorous with pileus when dried; ring more or less appendiculate, superior when adhering to stipe, dull gold when dried.

Hyphae of pileus cuticle loosely interwoven, usually repent; pileocystidia locally abundant (on disc), loosely fasciculate or scattered, 2.3-6.0 μm diam, usually unbranched; hyphae of pileus flesh 3.0-12.2 μm diam, occasionally inflated, without clamp connections, thin-walled. Lamella trama irregular; hyphae 3.0-6.0 μm diam, uninflated; basidia 5.5-6.0 x 15.3-18.5 μm , 4-sterigmate, without clamp connections; cheilocystidia scattered, catenulate chains of 2-3-4 cells, to 6.0 μm diam, thin-walled. Hyphae of stipe surface above ring 3.0-15.3 μm diam, parallel, tightly packed. Hyphae of ring 3.0-7.5 μm diam. Cells of universal veil (stipe surface below ring) inflated, to 26.0 μm diam, without clamp connections, thin-walled, hyaline.

Spores 5.3-6.0 x 3.8-4.5 μ m, broadly ellipsoid to ovoid; lacking germ pore (SEM); wall dark brown, less than 0.6 μ m thick; apiculus indiscernible or a hyaline spot in the spore wall.

The type collection contains three fragmented fruit bodies, one mature, two immature, as well as brief notes by Murrill.

Schaeffer macrochemical reaction: negative.

Agaricus praemagnus Murrill. 1918. Mycologia 10: 78.

TYPE SPECIMEN (holotype, explicit): NY, Cuba, 13.v.04, coll. F. S. Earle, det. W. A. Murrill, no. 18. (!)

Stature of carpophore campestroid; mature pileus convex to expanded, to 11 cm diam, dull gold with gray tinges and grayish appressed fibrillose scales when dried; dried flesh to 7 mm thick at disc, thinning to <1 mm at margin. Lamellae (mature) deep chocolate brown, free, to 5 mm deep. Stipe more or less bulbous, to 9.5 cm long, appearing fibrous, dull gray-gold when dried; ring superior, dull gold when dried.

Hyphae of pileus cuticle loosely interwoven; pileocystidia loosely fasciculate or scattered, 3.0-9.2 μ m diam, unbranched; hyphae of pileus flesh 4.5-15.3 μ m diam, inflated, without clamp connections; thin-walled. Lamella trama irregular; hyphae 2.3-6.0 μ m diam, uninflated or only slightly so; basidia 5.5-6.0 x 12.2-16.8 μ m, 4-sterigmate, without clamp connections; cystidia lacking. Hyphae of stipe surface above ring 3.0-10.7 μ m diam, parallel, tightly packed. Hyphae of ring 3.8-7.5 μ m diam. Cells of universal veil (stipe surface below ring) inflated, to 20.0(29.0) μ m diam, without clamp connections, thin-walled, hyaline.

Spores 6.0-7.5 x 3.8-4.5 μ m, ovoid to broadly ellipsoid; wall dark brown, 0.6 μ m thick; apiculus indiscernible or a hyaline spot in the spore wall.

The type collection consists of five mature fruit bodies, four buttons, fragments and notes by Murrill.

Schaeffer macrochemical reaction: negative.

Agaricus praerimosus Peck. "1904" (1905). N.Y. State Mus. Bull. 94: 36.

= *A. tabularis* Peck. 1898. Bull. Torrey Bot. Club 25: 325. (non *A. tabularis* Persoon. 1822. Myc. Eur. 3: 73; non *A. tabularis* Fries. 1821. Syst. Myc. I: 221).

TYPE SPECIMEN (neotype, *des. mihi*): NYS, Leadville, Colo., -ix.-, coll. E. B. Sterling, det. C. H. Peck, s.n. (!)

Stature of carpophore campestroid; mature pileus convex, to 5 cm diam, dull gray-tan when dried; surface coarsely and deeply rimose-

areolate; scales to 1 cm thick, truncately pyramidal, appearing layered as a stack of succedingly smaller plates, occasionally tomentose; dried flesh to 1 cm thick at disc, thinning to 1 mm at margin. Lamellae (mature) deep chocolate brown, free, to 10 mm deep. Stipe equal to slightly bulbous, to 5 cm long, appearing fibrous, concolorous with pileus when dried; ring superior, more or less appendiculate, pale to dingy tan when dried.

Hyphae of pileus cuticle tightly interwoven, repent; pileocystidia locally abundant (on scale surfaces), fasciculate, unbranched, to 4.5 μm diam; hyphae of pileus flesh to 15.3 μm diam, inflated, without clamp connections, thin-walled. Lamella trama irregular; hyphae 3.0-6.0 μm diam, uninflated or only slightly so; basidia 6.0-7.5 $\times$ 18.5-26.0 μm , 4-sterigmate, without clamp connections; cystidia lacking. Hyphae of stipe surface above ring 4.5-10.7 μm diam, parallel, tightly packed. Hyphae of ring 2.3-4.5 μm diam. Cells of universal veil (stipe surface below ring) inflated, to 10.7 μm diam, without clamp connections, thin-walled, hyaline.

Spores 6.0-7.5 $\times$ 6.0-7.0 μm , subglobose; wall dark brown, 0.6 μm thick; apiculus minute, rarely discernible, hyaline.

Schaeffer macrochemical reaction: negative.

Note: Because this collection is the only one of this taxon among the Peck specimens, but not the one referred to by him in the original description, I have established this as a neotype. The collection consists of numerous fragments in rather poor condition; an immature form is in fair condition.

Agaricus projectellus Murrill. 1941. *Mycologia* 33: 447.

TYPE SPECIMEN (holotype, explicit): FLAS, Gainesville, Fla., 3.vi.38, coll. E. West, L. Arnold & W. A. Murrill, det. W. A. Murrill, no. 16219. (!) Isotype: NY, s.n. (!)

Stature of carpophore placomycetoid; mature pileus plane, to 5.5 cm diam, uniformly pale tan when dried; surface appearing smooth; dried flesh to 1.5 mm thick at disc, thinning to <1 mm at margin; margin projecting 5 mm. Lamellae (mature) deep chocolate brown, free, to 5 mm deep. Stipe equal to more or less bulbous, to 6 cm long, appearing fibrous, concolorous with pileus when dried; ring median, somewhat appendiculate, dull gold when dried.

Hyphae of pileus cuticle interwoven, usually repent; pileocystidia loosely fasciculate or scattered, 3.0-7.5 μm diam, unbranched; hyphae of pileus flesh mostly highly inflated, (3.0-6.0)10.7-16.8 μm diam, without clamp connections, thin-walled. Lamella trama irregular; hyphae 2.3-4.5 μm diam, uninflated; basidia 6.0-7.5 $\times$ 13.8-24.5 μm , 4-sterigmate, without clamp connections; cystidia lacking. Hyphae of stipe surface above ring 3.0-12.2 μm diam, parallel, tightly packed. Hyphae of ring 6.0-12.2 μm diam. Cells of universal veil (pileus surface) inflated, to 29.0 μm diam, without clamp connections, thin-walled, hyaline.

Spores $6.0-7.5 \times 3.8-5.3 \mu\text{m}$, broadly ellipsoid; lacking germ pore (SEM); wall dark brown, $0.6 \mu\text{m}$ thick; apiculus minutely papillate, hyaline or indiscernible.

The type collection contains three entire mature fruit bodies and brief notes by Murrill; the isotype consists of mature and immature fragments.

Schaeffer macrochemical reaction: negative.

Agaricus pseudoplacomyces Murrill. 1945. Quart. J. Florida Acad. Sci. 8: 194.

TYPE SPECIMEN (holotype, explicit): FLAS, Gainesville, Fla., 24.v.44, coll. & det. W. A. Murrill, no. 20483. (!)

Stature of carpophore placomycetoid; mature pileus convex to plane, to 5 cm diam, brown when dried; surface brown fibrillose; dried flesh to 1 mm thick at disc, thinning at margin. Lamellae (mature) deep chocolate brown, free, to 3 mm deep. Stipe bulbous, to 3 cm long, appearing fibrous, concolorous with pileus when dried; ring superior, gold when dried.

Hyphae of pileus cuticle interwoven, usually repent; pileocystidia tightly fasciculate, to $9.2 \mu\text{m}$ diam, unbranched; hyphae of pileus flesh $4.5-18.5 \mu\text{m}$ diam, inflated, without clamp connections, thin-walled. Lamella trama irregular; hyphae $2.3-6.0 \mu\text{m}$ diam, uninflated; basidia $6.0-9.2 \times 10.7-13.8 \mu\text{m}$, 4-sterigmate, without clamp connections; cystidia lacking. Hyphae of stipe surface above ring $4.5-20.0 \mu\text{m}$ diam, parallel, tightly packed. Hyphae of ring $4.5-13.8 \mu\text{m}$ diam. Cells of universal veil (stipe surface below ring) inflated, to $30.5 \mu\text{m}$ diam, without clamp connections, thin-walled, hyaline.

Spores $4.5-6.0 \times 3.8-4.5(6.0) \mu\text{m}$, subglobose to ovoid; lacking germ pore (SEM), wall dark brown, $0.6 \mu\text{m}$ thick; apiculus indiscernible.

The type collection consists of one mature and one immature fruit body as well as fragments. Also included are notes and a sketch by Murrill.

Schaeffer macrochemical reaction: negative.

Agaricus pusillus Peck. 1900. N.Y. State Mus. Rep. p. 152. non *A. pusillus* Pers. per Fries. 1821. Syst. Myc. 1: 279; bas. *Amanita pusilla* Pers. 1797. Obs. Mycol. 2: 36. See *A. micromegethus* Peck.

Agaricus rhoadsii Murrill. 1939. Bull. Torrey Bot. Club 66: 29.

TYPE SPECIMENS (holotype, explicit): FLAS, Gainesville, Fla., 7.ix.38, coll. Rhoads & Murrill, det. Murrill, no. 18117. (!)

Stature of carpophore placomycetoid; mature pileus truncate-conic, to 4 cm diam, dull tan with brown fibrils when dried; surface finely fibrillose-squamulose; dried flesh to 2 mm thick at disc, thinning to < 1 mm at margin. Lamellae (mature) deep chocolate brown, free, to 1.5 mm deep. Stipe bulbous, to 6.5 cm long, appearing fibrous, concolorous with pileus when dried; ring appendiculate, superior when adhering to stipe, dull gold when dried.

Hyphae of pileus cuticle interwoven, usually repent; pileocystidia loosely fasciculate or scattered, 4.5-7.5 μm diam, unbranched; hyphae of pileus flesh 6.0-13.8 μm diam, inflated, without clamp connections, thin-walled. Lamella trama irregular; hyphae 2.3-7.5 μm diam, uninflated or only slightly so; basidia 4.5-7.0 x 10.7-15.3 μm , 4-sterigmate, without clamp connections; cystidia lacking. Hyphae of stipe surface above ring 4.5-15.3 μm diam, parallel, tightly packed. Hyphae of ring 3.0-11.5 μm diam. Cells of universal veil (stipe surface near base) inflated, to 27.5 μm diam, without clamp connections, thin-walled, hyaline.

Spores 5.3-6.0 x 3.8-4.5 μm , ellipsoid, broadly ellipsoid or ovoid; lacking germ pore (SEM); wall dark brown, 0.6 μm thick; apiculus indiscernible.

The type consists of one mature fruit body in seven pieces. Notes on the fresh condition written by Murrill accompany the specimen.

Schaeffer macrochemical reaction: negative.

Agaricus rodmanii Peck. 1884. N.Y. State Mus. Nat. Hist. Ann. Rep. 36: 45-46.

TYPE SPECIMEN (holotype, explicit): NYS, Astoria, L.I., N.Y., no date, coll. Washington Rodman, det. C. H. Peck, s.n. (!)

Stature of carpophore campestroid; pileus convex, expanded to plane, to 10 cm diam, dull tan when dried; surface smooth to slightly rimose-squamose on disc; dried flesh to 5 mm thick at disc, thinning to 1 mm at margin; margin decurved. Lamellae (mature) deep chocolate brown, free, to 2 mm deep. Stipe equal, to 7.5 cm long, appearing fibrous, concolorous with pileus; ring median to inferior, flaring upward, dull tan when dried.

Hyphae of pileus cuticle loosely interwoven, usually repent; pileocystidia abundant, loosely fasciculate, 1.5-3.0 μm diam, unbranched; hyphae of pileus flesh to 18.5 μm diam, inflated, without clamp connections, thin-walled. Lamella trama irregular; hyphae 3.0-4.5 μm diam, inflated; basidia 6.0-7.5 x 13.8-18.5 μm , 4-sterigmate, without clamp connections; cystidia lacking. Hyphae of stipe surface above ring to 7.5 μm diam, parallel, tightly packed. Hyphae of ring 3.0-5.5 μm diam. Hyphae of universal veil (stipe surface below ring) inflated, to 7.5 μm diam, without clamp connections, thin-walled, hyaline.

Spores 6.0 x 4.5-6.0 μm , ovoid to ellipsoid when young, globose to subglobose in age; lacking germ pore (SEM); wall dark brown, 0.6 μm thick; apiculus minutely papillate, hyaline.

The type collection consists of fragments of approximately four fruit bodies, all mature.

Schaeffer macrochemical reaction: negative.

Agaricus rubribrunnescens Murrill. 1922. *Mycologia* 14: 216.

TYPE SPECIMEN (holotype, explicit): NY, N.Y., 8.ix.16, coll. & det. W. A. Murrill, s.n. (!)

Stature of carpophore placomycetoid; mature pileus convex to expanded, to 5 cm diam, brown with darker brown scales when dried; dried flesh to 3 mm thick at disc, thinning to < 1 mm at margin. Lamellae (mature) deep chocolate brown, free, to 3 mm deep. Stipe equal to more or less bulbous, to 4 cm long, appearing fibrous, brown when dried; ring superior, gold when dried.

Hyphae of pileus cuticle interwoven, usually repent; pileocystidia fasciculate, 7.5-13.8 μ m diam, unbranched; hyphae of pileus flesh 4.5-38.3 μ m diam, inflated, without clamp connections, thin-walled. Lamella trama irregular; hyphae 3.0-21.5 μ m diam, occasionally inflated; basidia 4.5-7.0 x 15.3-18.5 μ m, 4-sterigmate, without clamp connections; cheilocystidia scattered, napiform, to 20.0 μ m diam. Hyphae of stipe surface above ring 6.0-27.5 μ m diam, parallel, tightly packed. Hyphae of ring 4.5-9.2 μ m diam. Cells of universal veil (stipe surface below ring) inflated, to 24.5 μ m diam, without clamp connections, thin-walled, hyaline.

Spores 4.5-5.5(6.0) x 3.0-3.8 μ m, ellipsoid or broadly ellipsoid; wall dark brown, 0.6 μ m thick; apiculus indiscernible or a hyaline spot in the spore wall.

The type consists of four mature fruit bodies accompanied by notes written by Murrill.

Schaeffer macrochemical reaction: negative.

Agaricus solidipes Peck. 1904. *Bull. Torrey Bot. Club* 31: 180.

TYPE SPECIMEN (holotype, implicit): NYS, Denver, Colo., no date, coll. E. B. Sterling, det. C. H. Peck, s.n. (!)

Stature of carpophore campestroid; mature pileus convex, to 7 cm diam, pale cream when dried; surface squamose or rimose-squamose, scales imbricate, to 4 mm thick; dried flesh to 5 mm thick at disc, thinning to < 1 mm at margin; margin involute. Lamellae (mature) deep chocolate brown, free, to 6 mm deep. Stipe equal, to 3.5 cm long, appearing fibrous, concolorous with the pileus when dried; ring superior to appendiculate, cream colored when dried.

Hyphae of pileus cuticle tightly interwoven, repent; pileocystidia lacking; hyphae of pileus flesh highly inflated, to 27.5 μ m diam, without clamp connections, thin-walled. Lamella trama irregular; hyphae

3.0-4.5 μm diam, irregularly inflated; basidia 4.5-7.5 x 20.0-23.0 μm , 4-sterigmate, without clamp connections; cystidia lacking. Hyphae of stipe surface above ring 3.0-9.2 μm diam, parallel, tightly packed. Hyphae of ring 3.0-9.2 μm diam. Hyphae of universal veil (stipe surface below ring) inflated, to 16.8 μm diam, without clamp connections, thin walled, hyaline.

Spores 7.5-12.2 x 6.0-7.5 μm , subglobose to ellipsoid or ovoid; lacking germ pore (SEM); wall dark brown, 0.6 μm thick; apiculus papillate to barely discernible, hyaline.

Schaeffer macrochemical reaction: negative.

Note: This collection is considered an implicit holotype because it is the only collection whose collection site and collector coincide with the data in the original description. There are sixteen fruit bodies, three of them immature.

Agaricus sphaerosporus Peck. 1904. Bull. Torrey Bot. Club 31: 181. *non A. sphaerosporus* Krombholz. 1836. Naturgetreue Abbildungen u. Beschreibungen der Essbaren, Schädlichen u. Verdächtigen Schwämme. Viertes Heft. Prag. p. 10. See *A. pilosporus* Peck.

Agaricus subalachuanus Murrill. 1942. Lloydia 5: 151.

TYPE SPECIMEN (holotype, explicit): FLAS, Gainesville, Fla., 29.viii.39, coll. & det. W. A. Murrill, no. 19000. (!) Isotype: NY, s.n. (!)

Stature of carpophore placomycetoid; mature pileus convex to subumbonate, to 1.5 cm diam, gold when dried, surface appearing fibrillose; dried flesh 1 mm thick at disc, thinning at margin; margin more or less inrolled. Lamellae (mature) deep chocolate brown, free, to 2 mm deep. Stipe equal to somewhat bulbous, to 2.5 cm long, appearing fibrous, concolorous with pileus when dried; ring superior when adhering to stipe, appendiculate, cream colored when dried.

Hyphae of pileus cuticle interwoven, usually repent; pileocystidia scattered or fasciculate, to 4.5 μm diam, usually unbranched; hyphae of pileus flesh 3.0-12.2 μm diam, occasionally inflated, without clamp connections, thin-walled. Lamella trama irregular; hyphae 2.3-6.0 μm diam, uninflated; basidia 7.5 x 21.5-29.0 μm , 4-sterigmate, without clamp connections; cystidia lacking. Hyphae of stipe surface above ring 3.8-16.8 μm diam, parallel, tightly packed. Hyphae of ring 2.3-6.0 μm diam. Cells of universal veil (stipe surface below ring) inflated, to 23.0 μm diam, without clamp connections, thin-walled, hyaline.

Spores 6.0-7.0 x 4.5 μm , broadly ellipsoid; lacking germ pore (SEM); wall dark brown, 0.6 μm thick; apiculus minutely papillate to indiscernible, hyaline.

The type collection consists of approximately seven fruit bodies, all mature, plus fragments and brief notes by Murrill.

Schaeffer macrochemical reaction: negative.

Agaricus subarvensis Murrill. 1942. Lloydia 5: 151.

TYPE SPECIMEN (holotype, explicit): FLAS, Lake Warburg, Alachua Co., Fla., 17.ii.39, coll. J. R. Watson & W. A. Murrill, det W. A. Murrill, no. 19253. (!)

Stature of carpophore placomycetoid; mature pileus convex to broadly umbonate, to 6 cm diam, gray when dried; surface appearing glabrous; dried flesh to 3 mm thick at disc, thinning to < 1 mm at margin. Lamellae (mature) deep chocolate brown, free, to 2 mm deep. Stipe bulbous, to 9 cm long, appearing fibrous, concolorous with pileus when dried; ring more or less appendiculate, superior when adhering to stipe, gray-gold when dried.

Hyphae of pileus cuticle interwoven, usually repent; pileocystidia fasciculate, 3.0-7.5 μ m diam, unbranched; hyphae of pileus flesh 6.0-13.8 μ m diam, occasionally inflated, without clamp connections, thin-walled. Lamella trama irregular; hyphae 4.5-6.0 μ m diam, uninflated; basidia 4.5-5.5 x 10.7 μ m, 4-sterigmate, without clamp connections; cystidia lacking. Hyphae of stipe surface above ring 4.5-10.0 μ m diam, parallel, tightly packed. Hyphae of ring 3.8-13.8 μ m diam. Cells of universal veil (stipe surface below ring) inflated, to 30.5 μ m diam, without clamp connections, thin-walled, hyaline.

Spores 4.5-6.0 x 4.5-5.5 μ m, subglobose to broadly ellipsoid; wall dark brown, 0.6 μ m thick; apiculus indiscernible.

The type collection consists of a single mature fruit body in five pieces plus a sketch and notes on the fresh condition by Murrill.

Schaeffer macrochemical reaction: negative.

Agaricus subcomptulus Murrill. 1945. Quart. J. Florida Acad. Sci. 8: 194-195.

TYPE SPECIMEN (holotype, explicit): FLAS, Gainesville, Fla., 2.vii.38, coll. & det. W. A. Murrill, no. 17335. (!)

Stature of carpophore placomycetoid; mature pileus convex to expanded or broadly umbonate, to 1.5 cm diam, tan to brown when dried; surface fibrillose; dried flesh 1.5 mm thick at disc, thinning to < 1 mm at margin; margin upturned with age. Lamellae (mature) deep chocolate brown, free, to 1.5 mm deep. Stipe bulbous, to 2.5 cm long, appearing fibrous, brown when dried; ring superior, gold when dried.

Hyphae of pileus cuticle loosely interwoven, usually repent; pileocystidia loosely fasciculate, 2.3-4.5 μ m diam, unbranched; hyphae of pileus flesh 6.0-10.7 μ m diam, somewhat inflated, without clamp connections, thin-walled. Lamella trama irregular; hyphae 3.0-5.5 μ m diam, uninflated; basidia 6.0-7.5 x 13.8-18.5 μ m, 4-sterigmate, without clamp connections; cystidia lacking. Hyphae of stipe surface above ring 3.0-13.8 μ m diam, parallel, tightly packed. Hyphae of ring 3.0-6.0 μ m diam. Cells of universal veil (stipe surface below ring)

inflated, to 15.3 μm diam, without clamp connections, thin-walled, hyaline.

Spores 4.5-7.0 x 3.0-4.5 μm , ellipsoid to broadly ellipsoid; wall dark brown, 0.6 μm thick; apiculus indiscernible or a hyaline spot in the spore wall.

The type collection consists of three fragmented mature fruit bodies accompanied by brief notes by Murrill.

Schaeffer macrochemical reaction: negative.

Agaricus subfloridanus Murrill. 1942. *Lloydia* 5: 151-152.

TYPE SPECIMEN (holotype, explicit): FLAS, Alachua Co., Gainesville, Fla., 12.iii.39, coll. & det. W. A. Murrill, no. 18611. (!)
Isotype: NY, s.n. (!)

Stature of carpophore campestroid; mature pileus expanded, to 8 cm diam, dull gold when dried; dried flesh to 6 mm thick around depressed disc, thinning to < 1 mm at margin; margin projecting 2-3 mm. Lamellae (mature) deep chocolate brown, free, to 5 mm deep. Stipe bulbous, cupulate, to 4 cm long, appearing fibrous, gray-gold when dried; ring median, brown when dried.

Hyphae of pileus cuticle interwoven, usually repent; pileocystidia loosely fasciculate, unbranched, 3.0-7.5 μm diam; hyphae of pileus flesh inflated, to 21.5 μm diam, without clamp connections, thin-walled. Lamella trama irregular; hyphae 1.5-4.5 μm diam, uninflated; basidia 7.5 x 15.3-21.5 μm , 4-sterigmate, without clamp connections; cheilocystidia scattered, napiform, 7.5-12.2 μm diam. Hyphae of stipe surface above ring 5.3-15.3 μm diam, parallel, tightly packed. Hyphae of ring 7.0-12.2 μm diam. Cells of universal veil (stipe surface below ring) inflated, to 46.0 μm diam, without clamp connections, thin-walled, hyaline.

Spores 5.3-6.0 x 3.8-4.5 μm , broadly ellipsoid; wall dark brown, 0.6 μm thick; apiculus indiscernible.

The type collection, one broken, mature fruit body, is accompanied by a sketch and description of the fresh condition by Murrill. The isotype contains one mature pileus.

Schaeffer macrochemical reaction: negative.

Agaricus subhortensis Murrill. 1946. *Lloydia* 9: 328.

TYPE SPECIMEN (holotype, explicit): FLAS, Gainesville, Fla., 8.i.45, coll. & det. W. A. Murrill, no. 17971. (!)

Stature of carpophore placomycetoid; mature pileus convex to plane, to 4.5 cm diam, brown, surface covered with brown appressed fibrils when dried; dried flesh to 2 mm thick at disc, thinning to < 1 mm at margin. Lamellae (mature) deep chocolate brown, free, to 4 mm deep. Stipe equal, to 3 cm long, appearing fibrous, brown when dried;

ring absent on type material.

Hyphae of pileus cuticle interwoven, usually repent; pileocystidia fasciculate, to 7.5 μm diam, unbranched; hyphae of pileus flesh 4.5-23.0 μm diam, occasionally inflated, without clamp connections, thin-walled. Lamella trama irregular; hyphae 4.5-7.5(15.3) μm diam, occasionally inflated; basidia 7.5-9.2 x 20.0-27.5 μm , 4-sterigmate, without clamp connections; cystidia lacking. Cells of universal veil (stipe surface near base) inflated, to 18.5 μm diam, without clamp connections, thin-walled, hyaline.

Spores 6.0-8.5 x 5.3-6.0 μm , subglobose, subovoid or broadly ellipsoid; wall dark brown, 0.6 μm thick; apiculus a hyaline spot in the spore wall.

The type collection consists of one mature, broken fruit body and brief notes by Murrill.

Schaeffer macrochemical reaction: negative.

Agaricus subnitens Peck. 1909. Bull. Torrey Bot. Club 36: 335.

TYPE SPECIMEN (holotype, implicit): NYS, Claremont, Calif., -.i.09, coll. C. F. Baker, det. C. H. Peck, s.n. (!)

Stature of carpophore campestroid; mature pileus broadly convex or depressed in center, to 5.5 cm diam, dull tan when dried; surface fibrillose; dried flesh to 2 mm thick at disc, thinning to <1 mm at margin. Lamellae (mature) deep chocolate brown, free, to 3 mm deep. Stipe subequal to bulbous, to 4.5 cm long, appearing fibrous, colorous with pileus when dried; ring superior, cream-gray when dried.

Hyphae of pileus cuticle interwoven, usually repent; pileocystidia abundant, to 9.2 μm diam, unbranched, fasciculate; hyphae of pileus flesh to 15.3 μm diam, inflated, without clamp connections, thin-walled. Lamella trama irregular; hyphae 1.5-3.0 μm diam, uninflated; basidia 4.5-6.0 x 13.8-18.5 μm , 4-sterigmate, without clamp connections; cystidia lacking. Hyphae of stipe surface above ring 4.5-7.5 μm diam, parallel, tightly packed. Hyphae of ring 4.5-7.5 μm diam. Cells of universal veil (stipe surface below ring) inflated, to 23.0 μm diam, without clamp connections, thin-walled, hyaline.

Spores 6.0-9.2 x 4.5-6.0 μm , broadly ellipsoid to ovoid; lacking germ pore (SEM); wall dark brown, 0.6 μm thick; apiculus minutely papillate or indiscernible.

Schaeffer macrochemical reaction: negative.

Note: This is considered an implicit holotype because it is the only collection under this name among the Peck specimens and because its date, collection site and collector coincide with the data in the original description. The collection contains four fruit bodies including two immature forms plus fragments and brief notes.

Agaricus suboreades Murrill. 1942. Lloydia 5: 152.

TYPE SPECIMEN (holotype, explicit): FLAS, Gainesville, Fla., 14.vii.38, coll. & det. W. A. Murrill, no. 17693. (!) Topotype: 28.vi.38, coll. & det. W. A. Murrill, no. 17257. (!)

Stature of carpophore placomycetoid; mature pileus convex to plane or somewhat umbonate, to 2.0 cm diam, golden brown when dried; surface brown squamulose; dried flesh to 2.0 mm thick at disc, thinning to < 1.0 mm at margin. Lamellae (mature) deep chocolate brown, free, to 2.0 mm deep. Stipe bulbous, to 3.5 cm long, appearing fibrous, concolorous with pileus when dried; ring superior, membranous, gold when dried.

Hyphae of pileus cuticle interwoven, usually repent; pileocystidia loosely fasciculate or scattered, 2.3-3.1 μ m diam, branched or unbranched; hyphae of pileus flesh 4.6-15.3 μ m diam, occasionally inflated, without clamp connections, thin-walled. Lamella trama irregular; hyphae 2.3-4.6 μ m diam, uninflated; basidia 6.1-7.6 x 16.8-21.4 μ m, 4-sterigmate, without clamp connections; cystidia lacking. Hyphae of stipe surface above ring 4.6-10.7 μ m diam, parallel, tightly packed. Hyphae of ring 2.3-4.6 μ m diam. Hyphae of universal veil (stipe surface below ring) 2.3-6.1 μ m diam, uninflated or only slightly so, without clamp connections, thin-walled, hyaline.

Spores 6.1-9.2 x 3.8-5.4 μ m, ellipsoid to ovoid; wall dark brown, 0.6 μ m thick; apiculus a hyaline spot in the spore wall.

The type collection consists of twelve fruit bodies, three of which are entire. All specimens are mature. The topotype contains two mature fruit bodies.

Schaeffer macrochemical reaction: negative.

Agaricus subplacomyces Murrill. Unpublished; see *A. badius* above.

Agaricus subponderosus Murrill. 1945. Quart. J. Florida Acad. Sci. 8: 195.

TYPE SPECIMEN (holotype, explicit): FLAS, Gainesville, Fla., 4.xii.44, coll. & det. W. A. Murrill, no. 21775. (!) Isotype: TENN, no. 21107. (!)

Stature of carpophore robustly campestroid; mature pileus convex to plane, to 8 cm diam, gold when dried; surface lightly squamulose; dried flesh to 12 mm thick around depressed disc, thinning to < 1 mm at margin; margin upturned with age. Lamellae (mature) deep chocolate brown, free, to 5 mm deep. Stipe equal, to 11 cm long, appearing fibrous, concolorous with pileus when dried; ring appendiculate, superior when adhering to stipe, gold when dried.

Hyphae of pileus cuticle interwoven, usually repent; pileocystidia loosely fasciculate or scattered, 2.3-4.5 μ m diam, usually unbranched;

hyphae of pileus flesh 3.0-12.2 μm diam, occasionally inflated, without clamp connections, thin-walled. Lamella trama irregular; hyphae 1.5-3.8(10.7) μm diam, occasionally inflated; basidia 6.0-7.0 x 12.2-15.3 μm , 4-sterigmate, without clamp connections; cystidia lacking. Hyphae of stipe surface above ring 4.5-12.2 μm diam, parallel, tightly packed. Hyphae of ring 2.3-9.2 μm diam. Hyphae of universal veil (stipe surface below ring) uninflated or only slightly so, 3.0-6.0 μm diam, without clamp connections, thin-walled, hyaline.

Spores 4.5-6.0 x 3.8-4.5 μm , subglobose to ellipsoid or ovoid; wall dark brown, 0.6 μm thick; apiculus indiscernible or a hyaline spot in the spore wall.

The type collection, in two boxes, consists of five fragmented, mature fruit bodies plus a description of their fresh condition written by Murrill.

Schaeffer macrochemical reaction: negative.

Agaricus subpratensis Murrill. 1918. Mycologia 10: 77.

TYPE SPECIMEN (holotype, explicit): NY, Jamaica, 9-10.i.09, coll. & det. W. A. Murrill, no. 824. (!)

Stature of carpophore campestroid; mature pileus globose to convex, to 7 cm diam, off-white with scattered brown appressed fibrillose scales when dried; dried flesh to 14 mm thick at disc, thinning to 1 mm at margin. Lamellae (mature) deep chocolate brown, free, to 5 mm deep. Stipe slightly bulbous, to 5 cm long, appearing fibrous, concolorous with pileus when dried; ring appendiculate, superior to median when adhering to stipe, off-white when dried.

Hyphae of pileus cuticle interwoven, usually repent; pileocystidia fasciculate or scattered, 3.0-5.5 μm diam, branched or unbranched; hyphae of pileus flesh 4.5-8.5 μm diam, inflated, without clamp connections, thin-walled. Lamella trama irregular; hyphae 3.0-7.5 μm diam, occasionally inflated; basidia 7.5-8.5 x 23.0-27.5 μm , 4-sterigmate, without clamp connections; cystidia lacking. Hyphae of stipe surface above ring 3.0-7.5 μm diam, parallel, tightly packed. Hyphae of ring 2.3-4.5 μm diam. Hyphae of universal veil (stipe surface below ring) uninflated or only slightly so, 6.0-10.7 μm diam, without clamp connections, thin-walled, hyaline.

Spores 6.0-7.5(8.5) x 6.0 μm , subglobose to ovoid or ellipsoid; wall dark brown, 0.6 μm thick; apiculus minutely papillate, hyaline.

The type consists of approximately twenty fruit bodies, plus fragments, and includes at least ten buttons.

Schaeffer macrochemical reaction: negative.

Agaricus subrufescens Peck. 1894. N.Y. State Mus. Bull. 43: 236-238.

TYPE SPECIMEN (holotype, implicit): NYS, Glen Cove, L.I., N.Y.,

-x.-, coll. W. Falconer, det. C. H. Peck, s.n. (!)

Stature of carpophore placomycetoid; pileus convex or broadly expanded, to 8 cm diam, dull gold to gray-gold when dried; surface silky fibrillose to obscurely squamulose; dried flesh to 5 mm thick at disc, thinning to < 1 mm at margin. Lamellae (mature) deep chocolate brown, free, to 5 mm deep. Stipe bulbous, to 10 cm long, appearing fibrous, concolorous with pileus when dried; ring superior, membranous, dull gold when dried.

Hyphae of pileus cuticle interwoven, usually repent; pileocystidia fasciculate, to 7.5 μ m diam, usually unbranched; hyphae of pileus flesh 3.0-18.5 μ m diam, occasionally inflated, without clamp connections, thin-walled. Lamella trama irregular; hyphae (2.3)3.0-6.0(9.2) μ m diam, uninflated; basidia 4.5-6.0 x 13.8-21.5 μ m, 4-sterigmate, without clamp connections; cystidia lacking. Hyphae of stipe surface above ring 3.0-6.0 μ m diam, parallel, tightly packed. Hyphae of ring 4.5-12.2 μ m diam. Cells of universal veil (stipe surface below ring) inflated, to 16.8 μ m diam, without clamp connections, thin-walled, hyaline.

Spores 4.5-7.5 x 4.5-5.5 μ m, subglobose to ovoid or ellipsoid; wall dark brown, 0.6 μ m thick; apiculus minutely papillate to indiscernible.

The type collection consists of four mature fruit bodies.

Schaeffer macrochemical reaction: negative.

Agaricus subrufescentoides Murrill. 1912. *Mycologia* 4: 299.

TYPE SPECIMEN (holotype, explicit): NY, Seattle, Wash., 20.x.11-1.xi.11, coll. & det. W. A. Murrill, no. 591. (!)

Stature of carpophore placomycetoid; mature pileus convex to expanded, more or less umbonate, to 7 cm diam, tan with brown disc and brown fibrillose scales when dried; dried flesh to 4 mm thick at disc, thinning to < 1 mm at margin. Lamellae (mature) deep chocolate brown, free, to 3 mm deep. Stipe equal, to 11 cm long, appearing fibrous, dull gray-gold when dried; ring superior, gold when dried.

Hyphae of pileus cuticle loosely interwoven; pileocystidia abundant, scattered to loosely fasciculate, 3.8-7.5(10.7) μ m diam, usually unbranched; hyphae of pileus flesh (3.0)7.5-18.5 μ m diam, usually inflated, without clamp connections, thin-walled. Lamella trama irregular; hyphae 2.3-10.7 μ m diam, occasionally inflated; basidia 6.0 x 18.5 μ m, 4-sterigmate, without clamp connections; cystidia lacking. Hyphae of stipe surface above ring 3.0-18.5 μ m diam, parallel, tightly packed. Hyphae of ring 2.3-6.0 μ m diam. Hyphae of universal veil (stipe surface below ring) with irregularly to clavately inflated tips, to 18.5 μ m diam, without clamp connections, thin-walled, hyaline.

Spores 5.5-7.0(8.5) x 3.8 μ m, ellipsoid to ovoid; wall dark brown, 0.6 μ m thick; apiculus papillate, hyaline.

The type consists of a single mature fruit body and brief notes by Murrill.

Schaeffer macrochemical reaction: negative.

Agaricus subrutilescens Kauffman. "1925" (1926). Pap. Mich. Acad. Sci. Arts Lett. 5: 141-142.

TYPE SPECIMEN (holotype, explicit): MICH, Mt. Hood, Ore., 11.x.22, coll. & det. C. H. Kauffman, s.n. (!)

Stature of carpophore placomycetoid; mature pileus plane, blackish-brown when dried; surface fibrous; dried flesh to 3 mm thick at disc, thinning to < 1 mm at margin. Lamellae (mature) deep chocolate brown, free, to 3 mm deep. Stipe absent from type material.

Hyphae of pileus cuticle interwoven, usually repent; pileocystidia fasciculate to scattered, 4.5-12.2 μm diam, unbranched; hyphae of pileus flesh 4.5-13.8 μm diam, occasionally slightly inflated, without clamp connections, thin-walled. Lamella trama irregular; hyphae 4.5-9.2 μm diam, occasionally slightly inflated; basidia 6.0 x 18.5-20.0 μm , 4-sterigmate, without clamp connections; cystidia lacking. Hyphae of stipe surface near pileus 4.5-7.5 μm diam, parallel, tightly packed. Hyphae of ring (from edge of pileus) 3.0-10.7 μm diam. Universal veil tissue absent on type material.

Spores 5.5-7.0 x 3.0-3.8 μm , ellipsoid; lacking germ pore (SEM); wall dark brown, 0.6 μm thick; apiculus minutely papillate, hyaline.

This description is incomplete because only a portion of the type was made available for study.

Schaeffer macrochemical reaction: negative.

Agaricus subsilvicola Murrill. 1918. Mycologia 10: 75.

TYPE SPECIMEN (holotype, explicit): NY, Jamaica, 2.xi.02, coll. F. S. Earle, det. W. A. Murrill, no. 380. (!)

Stature of carpophore placomycetoid; mature pileus expanded, to 5 cm diam, golden tan when dried; surface smooth; dried flesh to 1 mm thick at disc, thinning at margin. Lamellae (mature) deep chocolate brown, free, to 2 mm deep. Stipe more or less bulbous, to 6 cm long, appearing fibrous, concolorous with pileus when dried; ring superior, gold when dried.

Hyphae of pileus cuticle interwoven, repent; pileocystidia lacking; hyphae of pileus flesh 4.5-18.5 μm diam, inflated, without clamp connections, thin-walled. Lamella trama irregular; hyphae 2.3-4.5 μm diam, uninflated or only slightly so; basidia 5.5-6.0 x 15.3-18.5 μm , 4-sterigmate, without clamp connections; cystidia lacking. Hyphae of stipe surface above ring 4.5-18.5 μm diam, parallel, tightly packed. Hyphae of ring 1.5-6.0 μm diam. Universal veil tissue absent on type material.

Spores 5.5-7.0 x 3.0-3.8 μm , ellipsoid; wall dark brown, 0.6 μm thick; apiculus papillate or indiscernible.

The type collection consists of a single mature fruit body with notes by Murrill.

Schaeffer macrochemical reaction: negative.

Agaricus sulphureiceps Murrill. 1945. Quart. J. Florida Acad. Sci. 8: 195.

TYPE SPECIMEN (holotype, explicit): Fla., Gainesville, Fla., 18.vi.44, coll. & det. W. A. Murrill, no. 38805. (!)

Stature of carpophore placomycetoid; mature pileus expanded, to 2 cm diam, gold when dried; surface appearing glabrous; dried flesh 1 mm thick at disc, thinning at margin. Lamellae (mature) deep chocolate brown, free to 1 mm deep. Stipe more or less bulbous, to 3 cm long, appearing fibrous, concolorous with pileus when dried; ring superior, gold when dried.

Hyphae of pileus cuticle loosely interwoven; pileocystidia scattered, 3.0-4.5 μm diam, unbranched; hyphae of pileus flesh 3.0-12.2 μm , occasionally inflated, without clamp connections, thin-walled. Lamella trama irregular; hyphae 2.3-6.0 μm diam, uninflated; basidia 6.0-7.5 x 12.2-18.5 μm , 4-sterigmate, without clamp connections; cystidia lacking. Hyphae of stipe surface above ring 3.0-7.5 μm diam, parallel, tightly packed. Hyphae of ring 1.5-9.2 μm diam. Universal veil tissue absent on type material.

Spores 4.5-5.5 x 3.8 μm , subglobose to broadly ellipsoid; wall dark brown, 0.6 μm thick; apiculus minutely papillate or a hyaline spot in the spore wall.

The type collection consists of a single, mature fruit body in several pieces. It is accompanied by brief notes and a sketch by Murrill.

Schaeffer macrochemical reaction: negative.

Agaricus tabularis Peck. 1898. Bull. Torrey Bot. Club 25: 325. non *A. tabularis* Persoon. 1822. Myc. Eur. 3: 73; non *A. tabularis* Fries. 1821. Syst. Myc. I: 221. See *A. praerimosus* Peck.

Agaricus trisulphuratus Berkeley. 1885. Ann. Mag. Nat. Hist., Ser. 5, XV, P. 386.

TYPE SPECIMEN (holotype, explicit): KEW, Zanzibar, 6.xi.84, coll. & det. Berkeley, s.n.

This species, the type of the subgenus *Lanagaricus* Heinem., will be described and discussed in a subsequent work.

Agaricus venus Murrill. 1918. *Mycologia* 10: 76.

TYPE SPECIMEN (holotype, explicit): NY, Jamaica, 29-30.xii.08-2.i.09, coll. W. A. & E. L. Murrill det. W. A. Murrill, no. 749½. (!)

Stature of carpophore placomycetoid; mature pileus convex to plane or slightly depressed, to 7 cm diam, golden brown, darker on the disc, when dried; surface appearing glabrous; dried flesh to 3 mm thick at disc, thinning to <1 mm at margin. Lamellae (mature) deep chocolate brown, free, to 3 mm deep. Stipe subequal, to 6.5 cm long, appearing fibrous, concolorous with pileus when dried; ring median, gold when dried.

Hyphae of pileus cuticle interwoven, repent; pileocystidia lacking; hyphae of pileus flesh 6.0-21.5 µm diam, inflated, without clamp connections, thin walled. Lamella trama irregular; hyphae 6.0-26.0 µm diam, usually inflated; basidia 4.5-6.0 x 16.8-21.5 µm, 4-sterigmate, without clamp connections; cheilocystidia scattered, napiform, to 12.2 µm diam. Hyphae of stipe surface above ring 6.0-23.0 µm diam, parallel, tightly packed. Hyphae of ring 4.5-7.5 µm diam. Cells of universal veil (stipe surface below ring) inflated, to 29.0 µm diam, without clamp connections, thin-walled, hyaline.

Spores 6.0-7.0 x 3.8-4.5 µm, ellipsoid to broadly ellipsoid; wall dark brown, 0.6 µm thick; apiculus minutely papillate, hyaline or indiscernible.

The type collections consists of one mature fruit body, a water color drawing and brief notes by Murrill.

Schaeffer macrochemical reaction: negative.

Agaricus vinaceo-umbrinus Smith. 1944. *Mycologia* 36: 242.

TYPE SPECIMEN (holotype, explicit): MICH, Cisco, Texas, 15.ix.35, coll. E. A. Smith, det. A. H. Smith, s.n. (!)

Stature of carpophore placomycetoid; mature pileus campanulate to plano-umbonate, to 3.5 cm diam, dull gray-tan when dried; surface appressed fibrillose silky; dried flesh to 2 mm thick at umbo, thinning to <1 mm at margin. Lamellae (mature) deep chocolate brown, free, to 2 mm deep. Stipe equal, to 4 cm long, appearing fibrous, concolorous with pileus when dried; ring absent on type material.

Hyphae of pileus cuticle interwoven, repent; pileocystidia loosely fasciculate to matted, to 7.0 µm diam, usually unbranched; hyphae of pileus flesh 1.5-12.5 µm diam, occasionally inflated; without clamp connections, thin-walled; basidia 6.0-7.5 x 20.0-26.0 µm, 4-sterigmate, without clamp connections; cheilocystidia capitulate, some minutely warted at tip, to 7.5 µm diam, parallel, tightly packed. Hyphae of ring absent on type material. Hyphae of universal veil (stipe surface near base) inflated, to 16.8 µm diam, without clamp connections, thin-walled, hyaline.

Spores 6.0-7.0 x 4.5-5.5 µm, broadly ellipsoid to ovoid; lacking germ pore (SEM); wall dark brown, 0.6 µm thick; apiculus indiscernible.

This description is incomplete because only a portion of the type material was made available for study.

Schaeffer macrochemical reaction: negative.

Agaricus weberianus Murrill. 1939. Bull. Torrey Bot. Club 66: 29-30.

TYPE SPECIMEN (holotype, explicit): FLAS, Gainesville, Fla., 9.ix.38, coll. & det. W. A. Murrill, no. F18131. (!)

Stature of carpophore placomycetoid; mature pileus expanded, to 5.5 cm diam, surface covered with appressed imbricate scales, yellowish-brown with brown scales when dried; dried flesh to 3 mm thick at disc, thinning to < 1 mm at margin. Lamellae (mature) deep chocolate brown, free, to 1.5 mm deep. Stipe bulbous, to 6.5 cm long, appearing fibrous, concolorous with pileus when dried; ring superior, dull tan when dried.

Hyphae of pileus cuticle interwoven, usually repent; pileocystidia loosely fasciculate or scattered, 4.5-9.2 μm diam, usually unbranched; hyphae of pileus flesh 4.5-13.8 μm diam, occasionally inflated, without clamp connections, thin-walled. Lamella trama irregular; hyphae 3.0-12.2 μm diam, occasionally inflated; basidia 6.0-7.5 x 15.3-18.5 μm , 4-sterigmate, without clamp connections; cystidia lacking. Hyphae of stipe surface above ring 4.5-15.3 μm diam, parallel, tightly packed. Hyphae of ring 3.0-7.5 μm diam. Universal veil tissue absent on type material.

Spores 5.5-6.0 x 3.8-4.5 μm , broadly ellipsoid to subovoid; wall dark brown, 0.6 μm thick; apiculus indiscernible.

The type collection includes one mature fruit body, a sketch and a brief description of the fresh condition by Murrill.

Schaeffer macrochemical reaction: negative.

Agaricus wilmotii Murrill. 1946. Lloydia 9: 328-329.

TYPE SPECIMEN (holotype, explicit): FLAS, Gainesville, Fla., 20.vii.45, coll. W. A. Murrill & R. J. Wilmot, det. W. A. Murrill, no. 45895. (!) Isotype: NY, s.n. (!)

Stature of carpophore placomycetoid; mature pileus convex to plane, broadly umbonate or slightly depressed, to 8.5 cm diam, dull gold with brown scales when dried; surface, with the exception of the disc, covered with appressed-fibrillose scales; dried flesh to 5 mm thick at disc, thinning to < 1 mm at margin. Lamellae (mature) deep chocolate brown, free, to 3 mm deep. Stipe equal to slightly bulbous, to 12 cm long, appearing fibrous, tan when dried; ring more or less appendiculate, superior when adhering to stipe, dull gold when dried.

Hyphae of pileus cuticle interwoven, usually repent; pileocystidia 3.0-4.5 μm diam, tightly fasciculate, unbranched; hyphae of pileus flesh 3.0-18.5 μm diam, occasionally inflated, without clamp connections, thin-walled. Lamella trama irregular; hyphae 2.3-6.0(15.3) μm diam,

occasionally inflated; basidia 6.0-7.5 x 13.8-21.5 μm , 4-sterigmate, without clamp connections; cystidia lacking. Hyphae of stipe surface above ring 3.0-15.3 μm diam, parallel, tightly packed. Hyphae of ring 2.3-10.7 μm diam. Cells of universal veil (margin of ring) inflated, to 15.3 μm diam, without clamp connections, thin-walled, hyaline.

Spores 5.5-6.0 x 3.8-4.5 μm , subglobose to ovoid or broadly ellipsoid; wall dark brown, 0.6 μm thick; apiculus indiscernible.

The type collection contains approximately six fruit bodies, all fragmented, mature and immature. There are also extensive notes on the fresh condition taken by Murrill.

Schaeffer macrochemical reaction: negative.

Agaricus xanthodermoides Murrill. 1945. Quart. J. Florida Acad. Sci. 8: 195-196.

TYPE SPECIMEN (holotype, explicit): FLAS, Gainesville, Fla., 25.iii.44, coll. & det. W. A. Murrill, no. 22503. (!) Isotype: TENN, no. 16056. (!)

Stature of carpophore delicately campestroid; pileus convex to expanded, to 4 cm diam, dull gray-tan when dried; surface silky to slightly scaly; dried flesh to 4 mm thick at disc, thinning to <1 mm at margin; margin projecting 3 mm. Lamellae (mature) deep chocolate brown, free, to 4 mm deep. Stipe slightly bulbous, to 4.5 cm long, appearing fibrous, concolorous with pileus when dried; ring appendiculate, superior when adhering to stipe, dull gold when dried.

Hyphae of pileus cuticle loosely interwoven; pileocystidia fasciculate or scattered, 4.5-7.5 μm diam, unbranched; hyphae of pileus flesh 4.5-20.0 μm diam, occasionally inflated, without clamp connections, thin-walled. Lamella trama irregular; hyphae 2.3-4.5 μm diam, uninflated; basidia 6.0-7.5 x 15.3-21.5 μm , 4-sterigmate, without clamp connections; cystidia lacking. Hyphae of stipe surface above ring 6.0-20.0 μm diam, parallel, tightly packed. Hyphae of ring 2.3-12.2 μm diam. Cells of universal veil (stipe surface below ring) inflated, to 29.0 μm diam, without clamp connections, thin-walled, hyaline.

Spores 6.0-7.5 x 4.5-6.0 μm , globose to broadly ellipsoid; wall dark brown, slightly greater than 0.6 μm thick; apiculus indiscernible or a hyaline spot in the spore wall.

The type collection consists of numerous fragments of old and young specimens.

Schaeffer macrochemical reaction: negative.

NOMINA DUBIA

I believe the following species should be considered as *nomina dubia* because the type collections are either entirely or almost entirely destroyed, no other collections exist which could serve as lectotypes and the names have been rarely and sometimes variously applied. If spores were present, their dimensions follow the species citation.

TYPE SPECIMEN (holotype, explicit): NY, Palo Alto, Calif., 25.xi.11, coll. W. A. Murrill & L. S. Abrams, det. W. A. Murrill, no. 1227. (!)

Agaricus bivellatus Peck. 1909. Bull. Torrey Bot. Club 36: 335.

TYPE SPECIMEN (holotype, implicit): NYS, Claremont, Calif., -.i.-, coll. C. F. Baker, det. C. H. Peck, s.n. (!)

Agaricus californicus Peck. 1895. Bull. Torrey Bot. Club 22: 203.

TYPE SPECIMEN (holotype, implicit): NYS, Pasadena, Calif., 10.i.95, coll. A. J. McClatchie, det. C. H. Peck, no. 849. (!)

Agaricus flavitigens Murrill. 1912. Mycologia 4: 298.

TYPE SPECIMEN (holotype, explicit): NY, Seattle, Wash., 20.x. - 1.xi.11, coll. & det. W. A. Murrill, no. 381. (!)

Agaricus herraduraensis Murrill. 1918. Mycologia 10: 78.

TYPE SPECIMEN (holotype, explicit): NY, Herradura, Cuba, 3.viii.07, coll. F. S. Earle, det. W. A. Murrill, no. 575. (!)

Spores 4.5-6.0 x 3.8-4.5 μ m.

Agaricus hillii Murrill. 1912. Mycologia 4: 298.

TYPE SPECIMEN (holotype, explicit): NY, New Westminster, British Columbia, 12.xii.04, coll. A. I. Hill, det. W. A. Murrill, no. 104. (!)

Spores 5.5-6.0 x 3.8 μ m.

Agaricus hornei Murrill. 1918. Mycologia 10: 80.

TYPE SPECIMEN (holotype, explicit): NY, Herradura, Cuba, 25.xii.07, coll. F. S. Earle, & W. J. Horne, det. W. A. Murrill, no. 579. (!)

Spores 5.5-7.0 x 4.5 μ m.

Agaricus mcmurphyi Murrill. 1912. Mycologia 4: 299.

TYPE SPECIMEN (holotype, explicit): NY, Searsville Lake, Calif., 6.i.03, coll. J. McMurphy, det. W. A. Murrill, no. 35. (!)

Agaricus rutescens Peck. 1904. Bull. Torrey Bot. Club 31: 180.

TYPE SPECIMEN (holotype, implicit): NYS, Denver, Colo., 7.vi.02, coll. E. B. Sterling, det. C. H. Peck, no. 101, 175. (!)

Spores 7.0-7.5 x 4.5-6.0 μ m.

Agaricus shaferi Murrill. 1918. Mycologia 10: 81.

TYPE SPECIMEN (holotype, explicit): NY, Pindar del Rio, Cuba, 12.xii.11, coll. J. A. Shafer, det. W. A. Murrill, no. 11269. (!)

Spores 4.5-6.0 x 3.8-4.5 μ m.

Agaricus sterlingii Peck. 1902. Bull. Torrey Bot. Club 29: 73.

TYPE SPECIMEN (holotype, implicit): NYS, N. J., no date, coll. E. B. Sterling, det. C. H. Peck, s.n. (!)

Spores 6.0-9.2 x 4.5-6.0 μ m.

Agaricus muchilensis Murrill. 1918. Mycologia 10: 79.

TYPE SPECIMEN (holotype, explicit): NY, Xuchiles, Mexico, 17.i.10, coll. W. A. & E. L. Murrill, det. W. A. Murrill, no. 1156. (!)

Spores 6.0-10.0 x 3.0-4.5 μ m.

Acknowledgements

I wish to express deep gratitude to Dr. Ronald H. Petersen for his encouragement and many helpful comments during the course of this study.

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AGARICUS IN THE SOUTHEASTERN UNITED STATES

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Summary

A key to and descriptions of forty-two species of *Agaricus* from the southeastern United States is presented, including five described as new: *A. andrewii*, *A. aurescens*, *A. hannoni*, *A. nobelianus* and *A. tantulus*. Characters utilized in species circumscriptions include basidiocarp stature, nature of the universal veil tissue, presence or absence of cheilocystidia and spore size and shape. Nomenclatural history and problems are discussed.

INTRODUCTION

Agaricus as treated by Linnaeus (1753) was envisioned as including all lamellate fungi and was an arbitrary substitution for and synonymous to *Amanita* of Dillenius (1719). The Linnaean sense was adopted by Fries (1821), the starting point author, who divided the unwieldy assemblage into series based on the color of the spore print. His tribe 'Psalliota' contained the annulate, purple-brown spored, free-gilled agarics. Karsten (1879) recognized this as a discrete genus and reapplied the name *Agaricus* to it, this time in a restricted sense, thus circumscribing the modern genus concept.

The name *Agaricus*, with *A. campestris* as type species, was suggested for conservation by Donk (1962, 1964) and appeared as proposal 120 in Taxon (Anonymous, 1968). Conservation was officially made with its incorporation in the International Code of Botanical Nomenclature, Seattle ("1969", 1972, p. 254).

Agaricus has been given only regional attention in North America during the past century: Peck (1884) presented keys and descriptions for seven species in New York, but also proposed several new species over subsequent years; Murrill (1912) proposed new taxa from the Pacific coast, the tropical U.S., particularly Florida (Murrill, 1918),

and produced a general key to thirty species (Murrill, 1922¹); Kauffman (1918) described thirteen species from the Great Lakes region of Michigan and his key was essentially republished with the addition of one species by Coker (1928) in a Chapel Hill study; the latest and most modern treatment of the genus was by Hotson & Stuntz (1938), who included twenty-four species from western Washington. With the exception of Hotson & Stuntz, the aforementioned must be considered superficial by modern standards. More detailed descriptions of most of the species names by the preceding authors can be found in Freeman (1979).

European studies, however, are numerous and fairly recent: Barr (1937), Bohus (1961, 1969, 1971), Heinemann (many works between 1952 and 1977, concerning tropical as well as European taxa), Kühner & Romagnesi (1953), Lange (1926), Møller (1950, 1952), Pilát (1951), and Pegler & Raynor (1969).

The intention of this work, based on a study of North American type specimens (Freeman, 1979) and fresh collections has been not only to facilitate identification of chiefly herbarium specimens, but also to disclose consistent characters which can be of taxonomic value throughout the genus. Cataloging and more fully describing species of *Agaricus* from the southeastern United States offered a unique opportunity to study both northern species, which have reached their southern distributional limit, and southern species which terminate their ranges northward.

Specimens were examined from the following herbaria: the National Fungus Collections (BPI), the University of Florida (FLAS), The Royal Botanic Gardens (K), the University of Michigan (MICH), the University of North Carolina (NCU), The New York Botanical Garden (NY) and the University of Tennessee (TENN). Herbarium abbreviations are from those listed by Holmgren & Keuken (1974). In addition, collections of fresh specimens were made in the Smoky Mountains region of east Tennessee and western North Carolina.

TAXONOMIC CHARACTERS AND SUBGENERIC CIRCUMSCRIPTIONS

Current methods of taxonomic analysis of specimens of *Agaricus* include grouping on the basis of spore size (Lange, 1926), color changes upon bruising a fresh fruit body (Møller, 1950, 1952; Heinemann, 1956), the Schaeffer macrochemical reaction (cross reaction of aniline oil and nitric acid), presence or absence of cheilocystidia, and habitat (Isaacs, unpublished data, 1965, 1967). This utilization

¹A compilation of his personal keys to Florida fungi, including eighteen species of *Agaricus* has recently been published by Kimbrough (1972).

of fresh characters for species determination has laid the responsibility of identification on whomever identified the specimen while it was fresh, making later verification impossible. Moreover, the keys constructed by the preceding authors all utilize characteristics of fresh specimens -- practically useless when attempting to identify very young, old, or preserved specimens, especially those with scanty or inadequate notes. Confusing the issue is the Schaeffer reaction. According to Heinemann (1961), results could be obtained readily on dried specimens. The present study, however, disclosed only two positive reactions with dried material, in *A. lilaceps* (type specimen only, species not currently known from the southeastern U.S.) and various collections of *A. diminutivus*. The reaction, therefore, is questionable on dried material or of only limited value in North America.

Subgeneric concepts vary. Those envisioned by Møller combined the characters of color changes of bruised flesh, odor and Schaeffer reaction. His two "groups" were: Rubescentes, comprising those species whose flesh turned red where bruised, odor "acidulous" and Schaeffer reaction negative; and Flavescentes, containing those species whose flesh yellowed where bruised, odor of almonds, and Schaeffer reaction positive (except for one group which smelled of acid and reacted negatively to the Schaeffer reagents). Møller's keys to species utilized some morphological characters, habitat, and color. These characters are apparently striking when dealing with fresh specimens, but are impossible to verify in the dried condition (with the possible exception of the Schaeffer reaction, which, in this case, is only useful if positive).

Pilát (1951) accepted *Melanophyllum* as part of *Agaricus* and erected two subgenera based on this: subgenus *Melanophyllum*, containing one species whose spore print is smoky-purple and *Euagaricus*, containing all species now generally regarded as *Agaricus*. This did nothing to aid classification or indicate affinities within the currently accepted genus. His keys to sections and species were similar to those of Møller.

Authors have attempted to use constant characters for identification. Lange (1926) based subgenera on spore size. The subgenus *Megasporae* contained species whose spores were generally larger than $6.5 \times 4 \mu\text{m}$ and *Microsporae* whose spores were less than $6 \times 4 \mu\text{m}$. This held, however, for only a small number of species. Not only are the ranges only half a micron in difference, but overlap and variability in many species render the system useless. Other keys (Kauffman, 1918; Coker, 1928; Murrill, 1912, 1918, 1922, 1938) are based on size of carpophore, presence or absence of scales on the pileus surface, color and habitat, but are far too general for accurate identification and consist only of keys to species with no subgeneric designations.

The first author to attempt to combine macroscopic

(fresh condition) and microscopic characters was Heinemann (1956). His three subgenera were: *Agaricus*, which contains those species with a poorly developed general (universal) veil, pileus consisting of radially arranged hyphae and pileus surface smooth, fibrillose or squamulose; *Lanagaricus*, containing species with a well-developed general veil and thick-fleshed, scaly pileus and *Conioagaricus*, containing species with a thin-fleshed pileus often exhibiting a striate margin, a highly reduced annulus and cuticle hyphae which are often encrusted. His subsequent keys were based primarily on flesh coloration when bruised and the Schaeffer reaction. My study disclosed no members of his subgenus *Conioagaricus* in the southeastern United States.

The most logical classification scheme for the present work was Heinemann's modern treatment. Preliminary studies, which revealed hyphal (Fig. 1A) and cellular (Fig. 1B) universal veil types (see also Atkinson, 1906; Reijnders, 1963) reinforced the importance of this character for taxonomy. Problems arose initially in determining what Heinemann meant by "voile général peu développé" as opposed to "voile général plus ou moins abondant". The degree of development is difficult to precisely ascertain. As I have interpreted the condition, however, the subgenus *Agaricus* contains those species with the "peu développé" or hyphal universal veil, while the "voile plus ou moins abondant" group, *Lanagaricus*, contains those species with cellular universal veil tissue. Further support of this interpretation is the observation that hyphal universal veil tissue is generally found as only one or two hyphal layers at the stipe base, whereas cellular universal veil tissue can be observed on the stipe base and often on the pileus surface. "Abondant", then, is perceived as easily observed in more than one area on the carpophore.

Correlated with these veil types is stature and habitat: campestroid (pileus diameter divided by stipe length ratio equal to or greater than one), meadow or pasture inhabiting species almost always possess hyphal universal veil tissue; conversely, placomycetoid (pileus diameter divided by stipe length ratio less than one), forest inhabiting species almost always possess cellular universal veil tissue. Overlap of any of these characters is slight. In view of these findings, Heinemann's subgenera, which accommodate southeastern species, can be emended to acknowledge the above correlated characters.

TAXONOMY

Agaricus L. ex Fr., Syst. Mycol. 1: 8. 1821, emend. Karsten, Bidrag Kännedom Finlands Natur Folk 32: xxv, 482. 1879.
 [*Agaricus* Linnaeus, Species Plantarum 2: 1171. 1753.]
 = *Pratella* (Pers.) per S. F. Gray, A Natural Arrangement of British Plants, 626, 1821. (p.p.)
 = *Psalliota* (Fr.) Kummer, Fuhr. Pilzkunde 72: 23. 1871.

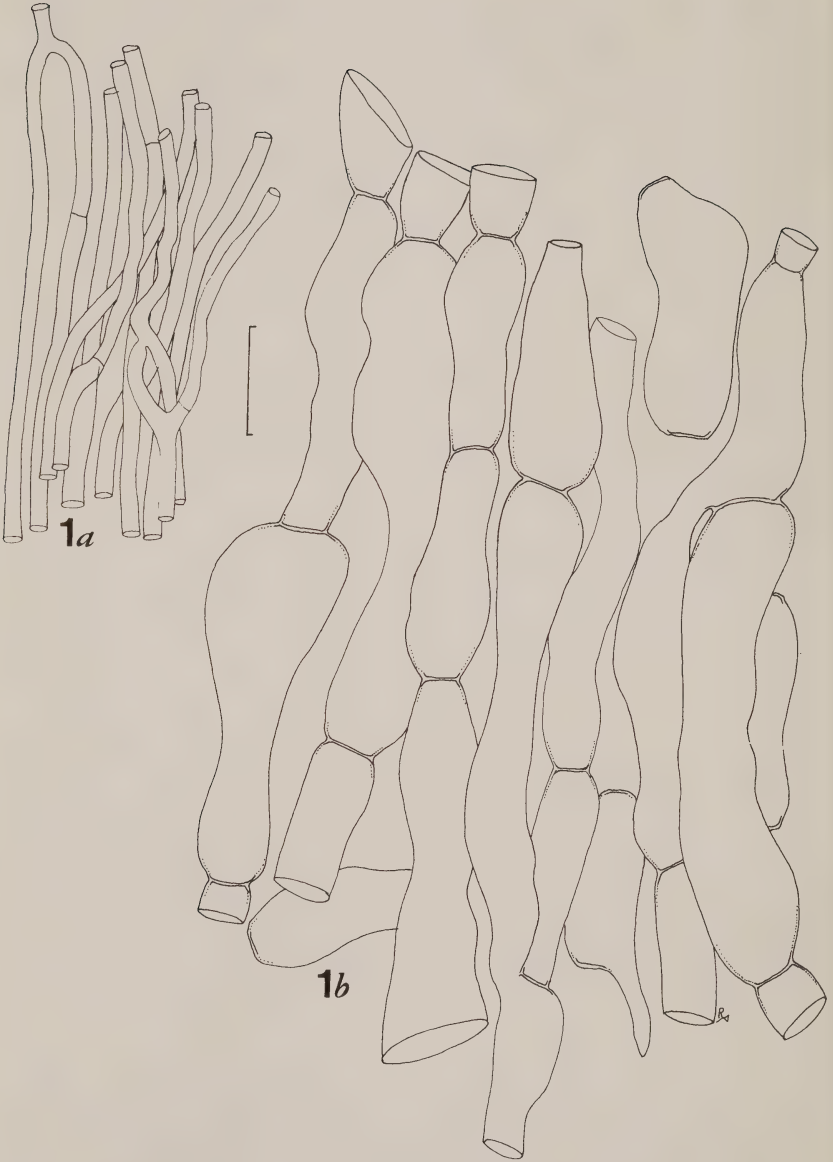


Figure 1. Hyphae of universal veil. a. Hyphae type.
b. Cellular type. Standard line equals 20 μm .

Habit of carpophore campestroid (pileus diameter-stipe length ratio > 1) or placomycetoid (pileus diameter-stipe length ratio < 1); pileus white or colored, glabrous, silky-fibrillose, fibrillose scaly or occasionally rimose-areolate, dry, never viscid; cuticle of interwoven, usually repent hyphae without clamp connections, rarely cellular (several tropical species); pileocystidia, if present, fasciculate or scattered, branched or unbranched; hyphae of context usually inflated, thin-walled, without clamp connections; hymenophore lamellate, lamellae free, grayish, white to pink or roseous in youth, deep chocolate brown when mature, trama regular, then irregular, hyphae inflated or not, without clamp connections; spore print deep chocolate brown, spores subglobose, ellipsoid or ovoid, wall generally less than $0.6 \mu\text{m}$ thick, apiculus papillate, hyaline or indiscernible; basidia clavate, 2- or 4-sterigmate, without clamp connections; cheilocystidia absent or present, napiiform, clavate or broadly clavate, several-celled or (rarely) ventricose-rostrate; pleurocystidia absent; ring superior or median, single or double or with floccose patches on the lower surface, hyphae filamentous, occasionally slightly inflated, without clamp connections; stipe equal or bulbous at the base, with or without rhizomorphs; hyphae parallel, tightly packed, thin-walled, without clamp connections; universal veil tissue appressed to lower surface of stipe, occasionally on the surface of the pileus, particularly the disc, or the lower surface of the ring, composed of thin-walled, filamentous to inflated or even cellular elements, without clamp connections.

Bruised flesh of stipe or pileus staining reddish, yellowish, brownish or not at all. Schaeffer reaction (cross reaction aniline oil with nitric acid) immediately or slowly positive (fire red to orange) or negative.

KEY TO SUBGENERA

1. Universal veil tissue of inflated or uninflated hyphae; fruit bodies thick-set, stature usually campestroid; stipe usually equal or subequal; generally occurring in meadows or pastures
Subgenus *Agaricus* Heinemann emend. Freeman, p.
1. Universal veil tissue cellular; fruit bodies usually thin-fleshed, stature usually placomycetoid; stipe often bulbous; generally occurring in woods.
Subgenus *Lanagaricus* Heinemann emend. Freeman, p.

Subgenus *Agaricus* Heinem. emend. Freeman

Flore Icon. des Champs. du Congo, Fasc. 5: 99. 1956.
 $\equiv$ *Agaricus* subgen. *Euagaricus* Pilát, Acta Mus. Nat. Pragae, 7B(1): 27. (p.p.)
 $\equiv$ *Agaricus* subgen. *Psalliota* Konrad & Maublanc, Rev. Hymeno. de France, 58. 1924-1937. (p.p.)

Type Species: *Agaricus campestris* L. per Fr.

Stature of fruit bodies usually campestroid (pileus diameter divided by stipe length ratio > 1); stipe usually equal or subequal; annulus often not well-developed; universal veil of inflated or uninflated hyphae (Fig. 1A); species generally fruiting in open areas, pastures or meadows.

Observations: The emendation of Heinemann's (1956) subgenera included emphasis on the nature of the universal veil tissue and omission of certain chemical tests which were either of no value in the present study (Schaeffer reaction) or required specimens in the fresh condition.

KEY TO SPECIES

1. Stature placomycetoid; pileus to 3.0 cm diam, squamulose; stipe to 4.0 cm long; cheilocystidia lacking; spores (4.5)6.0-9.2 x 3.8-5.5 μ m
1. *A. suboreades* Murr.
1. Stature campestroid 2
2. Cheilocystidia present 3
2. Cheilocystidia absent 5
3. Cheilocystidia pseudoparaphysoid, lageniform or ventricose-rostrate, to 7.5 μ m diam; pileus to 5.0 cm diam, squamulose to fibrillose; margin inrolled; stipe to 3 cm long; spores (5.3)6.0 x (3.8)4.5 μ m
2. *A. cylindriceps* var. *aureus* Murr.
3. Cheilocystidia clavate, broadly clavate, subpyriform or napiform 4
4. Universal veil hyphae inflated; cheilocystidia broadly clavate to napiform, 10.7-18.5 μ m diam, sparse; pileus glabrous, to 6.0 cm diam; spores (7.0)7.5-9.2 x (4.5)5.5-6.0 μ m
3. *A. andrewii* Freeman
4. Universal veil hyphae filamentous or only slightly inflated; cheilocystidia clavate, broadly clavate, or subpyriform, to 10.0 μ m diam, numerous; pileus smooth or becoming slightly squamulose with age, to 10 cm diam; spores variable, 5.5-6.0(7.5-10.0) x 3.8-4.5 (7.0) μ m
4. *A. campestris* L. per Fr. ss. Pilát
5. Pileus surface smooth (or possibly becoming rimose-squamose on disc only with age) 6
5. Pileus surface fibrillose to squamulose 8

6. Universal veil hyphae highly inflated, (20.0-30.0 μ m diam); spores 9.2-13.0 x 6.0-7.5 μ m; pileus to 5.0 cm diam; stipe to 3.5 cm long
5. *A. argenteus* Braendle in Peck
6. Universal veil hyphae and spores smaller than above 7
7. Fruit body extremely thick-set, flesh to 5 mm thick when dried; margin deeply decurved; pileus occasionally rimose-squamose on disc, to 10 cm diam; stipe to 7.5 cm long; spores 6.0 x 4.5-6.0 μ m 6. *A. rodmanii* Peck
7. Fruit body not as squat and full-bodied as above, dried flesh to 3 mm thick, margin even; pileus to 5 cm diam, stipe to 5 cm long; spores 4.5-6.0 x 3.0-4.5 μ m 7. *A. comptuliformis* Murr.
8. Spores (7.5)12.2 x (6.0)7.5 μ m; pileus surface broken up into rimose-squamose imbricate patches; pileus to 7 cm diam, margin inrolled; stipe to 4 cm long 8. *A. solidipes* Pk.
8. Spores smaller than above 9
9. Fruit body large, pileus to 12 cm diam; stipe equal, to 12 cm long; margin upturned with age; spores 4.5-6.0 x (3.0)3.8-4.5 μ m
9. *A. subponderosus* Murr.
9. Fruit body smaller than above 10
10. Pileus cylindric to convex and truncate, then expanded; margin more or less inrolled; surface minutely squamulose; pileus to 8 cm diam; stipe to 7.5 cm long; spores (5.3)6.0 x (3.8)4.5 μ m . . .
10. *A. cylindriceps* Murr. var. *cylindriceps*
10. Pileus campanulate, expanded, margin projected slightly; surface finely fibrillose; pileus to 4 cm diam; stipe to 3.5 cm long; spores 4.5-5.5(6.0) x (3.0)3.8(4.5) μ m
11. *A. sulphureiceps* Murr.

1. AGARICUS SUBOREADES MURRILL, Lloydia 5: 152. 1942.

TYPE SPECIMEN (holotype, explicit): FLAS, Gainesville, Fla., 14.vii.38, coll. & det. W. A. Murrill, no. 17693. (!)

Stature of carpophore placomycetoid; mature pileus convex to plane or somewhat umbonate, to 3 cm diam, roseous (Murrill), golden brown when dried; surface squamulose; dried flesh to 2 mm thick at disc, thinning to < 1 mm at margin. Lamellae (mature) deep chocolate brown, free, to 2 mm deep. Stipe bulbous, to 4 cm long, appearing fibrous, golden brown when dried; ring superior, membranous, gold

when dried.

Hyphae of pileus cuticle interwoven, usually repent; pileocystidia loosely fasciculate or scattered, 2.3-4.5 μ m diam, branched or unbranched; hyphae of pileus flesh 3.0-16.8 μ m diam, occasionally inflated, without clamp connections, thin-walled. Lamella trama irregular; hyphae 2.3-23.0 μ m diam, occasionally inflated; basidia 6.0-9.2 x 15.3-23.0 μ m, 4-sterigmate, without clamp connections; cystidia lacking. Hyphae of stipe surface above ring 3.0-16.8 μ m diam, parallel, tightly packed. Hyphae of ring 2.3-6.0 μ m diam. Hyphae of universal veil (stipe surface below ring) uninflated or only slightly so, 2.3-6.0 μ m diam, without clamp connections, thin-walled, hyaline.

Spores (4.5)6.0-9.2 x 3.8-5.5 μ m, subglobose to broadly ellipsoid or ovoid; wall dark brown, 0.6 μ m thick; apiculus a hyaline spot in the spore wall.

Schaeffer macrochemical reaction: negative.

Observations: This is one of several small placomycetoid species with a scaly pileus, but is readily distinguished from all others by its hyphal universal veil tissue and its large spores. Murrill (1942) seemed to feel that this species lay between *A.alachuanus* and *A. comptulus* in its outward appearance. It is, however, distinct from *A.alachuanus* which has cellular universal veil tissue, smaller spores and cheilocystidia. *Agaricus comptulus* ss. Pilát (1951) differs in having a glabrous and yellowish pileus and bearing much smaller spores than *A. suboreades*.

The species is most commonly found on grassy ground, in direct sun or shaded areas (*teste* Murrill) and up to the present time has been collected only in Florida. The edibility of this species is unknown, but its small size renders it impractical in this regard.

Specimens examined:

Florida: Gainesville, 14.vii.38, coll. & det. W. A. Murrill, no. 17963 (FLAS, TYPE); Gainesville, 31.viii.39, det. W. A. Murrill, no. 16055 (TENN); Gainesville, 30.viii.39, det. W. A. Murrill, no. 18447 (TENN); Gainesville, 9/5/38, det. W. A. Murrill, no. F19225 (FLAS); Gainesville, 8.viii.44, det. W. A. Murrill, no. F45885 (FLAS); Gainesville, 23.vii.44, det. W. A. Murrill, s.n. (NCU); Gainesville, 30.viii.39, det. W. A. Murrill, s.n. (BPI).

2. AGARICUS CYLINDRICEPS VAR. AUREUS MURRILL, Quart. J. Florida Acad. Sci. 8: 194. 1945.

TYPE SPECIMEN (holotype, explicit): FLAS, Gainesville, Fla., 23.x.42, coll. & det. W. A. Murrill, no. 20495. (!)

Stature of carpophore campestroid; pileus cylindric, then expanded, to 5 cm diam (Murrill), pallid with small yellow scales (Murrill), dull gold with golden brown scales when dried; dried flesh to 5 mm thick at disc, thinning to < 1 mm at margin; margin inrolled. Lamellae (mature) deep chocolate brown, free, to 4 mm deep. Stipe equal; to 3 cm long, base more or less flattened, appearing fibrous, concolorous with pileus; ring superior, gold when dried; odor strong, amygdaline (Murrill), flesh readily turning gold when handled (Murrill).

Hyphae of pileus cuticle interwoven, usually repent; pileocystidia fasciculate, 3.0-10.7 μm diam, unbranched; hyphae of pileus flesh 2.3-18.5 μm diam, inflated, without clamp connections, thin-walled. Lamella trama irregular; hyphae 2.3-10.7 μm diam, slightly inflated to uninflated; basidia 6.0-7.5 x 13.8-23.0 μm , 4-sterigmate, without clamp connections; cystidia (crush mounts) lageniform, ventricose-rostrate or pseudoparaphysoid, to 7.5 μm diam. Hyphae of stipe surface above ring 3.0-15.3 μm diam, parallel, tightly packed. Hyphae of ring 2.3-13.8 μm diam. Hyphae of universal veil (stipe surface below ring) mostly uninflated, to 18.5 μm diam, without clamp connections, thin-walled, hyaline.

Spores (5.3)6.0 x (3.8)4.5 μm , ovoid to ellipsoid; lacking germ pore (SEM); wall dark brown, 0.6 μm thick; apiculus papillate on immature spores, indiscernible on mature spores.

Schaeffer macrochemical reaction: negative.

Observations: The lageniform, ventricose-rostrate or pseudoparaphysoid cystidia immediately characterize this species. In addition, it is macroscopically distinctive for its small size and flattened stipe base.

Murrill (1945) said the species is readily recognized by its strong amygdaline odor and golden coloration when handled or dried. *Agaricus xanthodermus* is suggested, particularly as regards the yellowish staining of the fruit body, but according to Pilát (1951), *A. xanthodermus* has little or no odor, often cracks rimosely on the surface of the pileus and bears considerably larger spores. Murrill also remarked that the species will turn yellow in KOH, a trait which is apparently observed only on fresh specimens. Murrill synonymized the species with *A. amygdalinus* Curtis (*nomen herbariorum*), but I have found the two to be distinct.

The species occurs in open wooded areas (*teste* Murrill) and is known from Florida, Tennessee and South Carolina. Its distribution suggests that this is a coastal plain species which has extended its range into mountainous areas. Edibility is unknown.

Specimens examined:

Florida: Gainesville, 23.x.42, coll. & det. W. A. Murrill, no. 20495 (FLAS, TYPE); Gainesville, 27.v.43, det. W. A. Murrill, no. 21103 (TENN); Gainesville, 19.vi.42, det. W. A. Murrill, no. F20485 (FLAS); Gainesville, 14.ix.41, det. W. A. Murrill, no. F21511 (FLAS); Gainesville, 22.v.43, det. W. A. Murrill, no. F17700 (FLAS); Gainesville, 25.iii.44, det. W. A. Murrill (as *Agaricus projectellus*), no. 16053 (TENN).

South Carolina: Winnsboro, 23.v.66, det. A. H. Freeman, no. 29019 (TENN).

Tennessee: Knoxville, 6.vi.57, det. A. H. Freeman, no. 9239 (TENN); Knoxville, 6.vi.57, det. A. H. Freeman, no. 21689 (TENN); Knoxville, 30.v.55, det. B. F. Isaacs (as *A. subponderosus*), no. 21668 (TENN); Knoxville, 24.vi.60, det. A. H. Freeman, no. 23769 (TENN); Knoxville, 30.v.63, det. A. H. Freeman, no. 25526 (TENN); Gatlinburg, 21.vi.76, det. A. H. Freeman, no. 40092 (TENN); Claxton School, Anderson Co., 15.viii.42, coll. L. R. Hesler (as *A. silvicola*), s.n. (MICH).

3. AGARICUS ANDREWII FREEMAN SP. NOV.

TYPE SPECIMEN: TENN, West Waynesville, N.C., -.vii.75, coll. G. W. Freeman, det. A. H. Freeman, no. 40331.

Statura campestroidia; pileo 6 cm diam, convexo mox plano, albo, summo sericeo; stipito aequo, 4.5 cm longo; annulo superiore vel medio; cheilocystidiis paucis, napi-formis vel clavis, 10.7-18.5 μ m diam; hyphis integumentorum universorum -23.0 μ m diam; sporis (7.0)7.5-9.2 x (4.5)5.5-6.0 μ m.

Stature of carpophore campestroid; mature pileus convex to plane, to 6 cm diam, white, cream colored when dried; surface silky-fibrillose; dried flesh to 4 mm thick at disc, thinning to < 1 mm at margin; margin appendiculate. Lamellae pink in youth, deep chocolate brown when matured, free, to 3 mm deep. Stipe equal to tapering upward, to 4.5 cm long, appearing fibrous, concolorous with pileus; ring median to superior, cream colored when dried; odor mild.

Hyphae of pileus cuticle interwoven, usually repent; pileocystidia 2.3-5.5 μ m diam, scattered, unbranched; hyphae of pileus flesh 4.5-24.5(35.0) μ m diam, occasionally inflated, thin-walled, without clamp connections. Lamella trama irregular; hyphae 2.3-18.5 μ m diam, occasionally inflated; basidia 7.0-9.2 x 18.5-32.0 μ m, 2-4-sterigmate, without clamp connections; cheilocystidia broadly clavate to napi-form, 10.7-18.5 μ m diam, scattered, sparse. Hyphae of stipe surface above ring 4.5-18.5 μ m diam, parallel, tightly packed. Hyphae of ring 3.0-10.7 μ m diam. Hyphae of universal veil (stipe surface below ring) inflated, to 23.0 μ m diam, without clamp connections, thin-walled, hyaline.

Spores (7.0)7.5-9.2 x (4.5)5.5-6.0 μm , broadly ellipsoid to ovoid; wall dark brown, 0.6 μm thick; apiculus indiscernible.

Schaeffer macrochemical reaction: negative.

Observations: Macroscopically, this species is identical to glabrous forms of *A. campestris*. Microscopically, however, it is unique. Like *A. campestris*, *A. andrewii* bears cheilocystidia, but they are broadly clavate to napiform and sparse, as opposed to the numerous clavate, broadly clavate or subpyriform cheilocystidia of *A. campestris*. In addition, the universal veil hyphae of *A. andrewii* are highly inflated, whereas in *A. campestris* they are uninflated or only slightly so. *Agaricus andrewii* also produces somewhat narrower spores than *A. campestris*.

This is a meadow and pasture species and due to its close resemblance to *A. campestris* has probably been unwittingly eaten and proved edible. Further collections are needed to establish range of the species.

Specimens examined:

North Carolina: West Waynesville, -.vii.75, coll. G.W. Freeman, det. A. H. Freeman, no. 40331 (TENN, TYPE).

4. *AGARICUS CAMPESTRIS* LINNAEUS PER FRIES (Syst. Mycol. I: 281. 1821.) SS. PILÁT (Acta Mus. Nat. Pragae, 7B(1): 30. 1951.)

Stature of carpophore campestroid (fig. 2A); mature pileus to 10 cm diam, subglobose when young, expanded to plane upon maturity, white, cream when dried; surface silky-fibrillose, occasionally bearing (with age) brownish appressed squamules on the disc; dried flesh to 6 mm thick at disc, thinning at margin; margin projecting 2 mm. Lamellae pink to roseous in youth, deep chocolate brown when mature, free, to 3 mm deep. Stipe to 5 cm long, equal, concolorous with pileus; ring superior, indistinct to absent on older specimens, cream when dried.

Hyphae of pileus cuticle interwoven, repent; pileocystidia lacking; hyphae of pileus flesh 7.5-23.0 μm diam, inflated, without clamp connections, thin-walled. Lamella trama irregular; hyphae 2.3-7.5 μm diam, uninflated; basidia 7.5-9.2 x 20.0-27.5 μm , 4-sterigmate, without clamp connections; cheilocystidia 7.5-10.0 μm diam, scattered, clavate to broadly clavate to subpyriform. Hyphae of stipe surface above ring 2.3-15.3 μm diam, parallel, tightly packed. Hyphae of ring 2.3-10.7 μm . Hyphae of universal veil (stipe surface near base) uninflated or only slightly so, to 12.2 μm diam, without clamp connections, thin-walled, hyaline.

Spores variable, 5.5-10.0 x 3.8-7.0 μm , ovoid to very broadly ellipsoid; wall dark brown, 0.6 μm thick; apiculus

A**B**

Figure 2. Two common species: (A) *Agaricus campestris*; and (B) *Agaricus pocillator*.

indiscernible to minutely papillate, hyaline.

Schaeffer macrochemical reaction: negative.

Observations: In the absence of type material, Pilát's description and photographs are, I feel, sufficient for identification of this species. The species is ubiquitous and is characterized by uninflated or only slightly inflated universal veil hyphae, numerous cheilocystidia, field habitat and pink lamellae in youth. Spore size seems to be variable; in all other respects, however, small-spored and large-spored forms are identical.

This is a meadow and pasture species, often called "the blusher" or "pink bottom" due to the rosy-pink color of the immature lamellae. It is a prized edible fungus.

Specimens examined:

Florida: Gainesville, 28.iv.43, det. A. H. Smith, s.n. (MICH).

South Carolina: Clemson College campus, 16.viii.26, det. C. H. Kauffman, s.n. (MICH).

Tennessee: Knoxville, 24.vii.37, det. L. R. Hesler, no. 10702 (TENN); Smoky Mt. Nat'l. Park, 29.v.38, det. L. R. Hesler, no. 11441 (TENN); Knoxville, 11.xi.41, det. A. H. Smith, no. 14059 (TENN); Knoxville, 26.x.49, det. L. R. Hesler, no. 19483 (TENN); Knoxville, 26.x.49, det. L. R. Hesler, no. 19484 (TENN); Knoxville, 13.ix.51, det. A. H. Smith, no. 20179 (TENN); Knoxville, 13.ix.51, det. A. H. Smith, no. 20173 (TENN); Knoxville, 27.ix.54, det. A. H. Smith, no. 21342 (TENN); Knoxville, 9.vii.56, det. L. R. Hesler, no. 22314 (TENN); Knoxville, 2.vi.59, det. B. F. Isaacs, no. 22994 (TENN); Knoxville, 7.viii.59, det. L. R. Hesler, no. 23222 (TENN); Knoxville, 25.vi.60, det. L. R. Hesler, no. 23575 (TENN); Knoxville, 20.ix.62, det. L. R. Hesler, no. 24911 (TENN); Knoxville, 9.viii.62, det. L. R. Hesler, no. 24929 (TENN); Knoxville, 23.vii.63, det. L. R. Hesler, no. 27084 (TENN); Knoxville, 5.vi.65, det. B. F. Isaacs, no. 28061 (TENN); Knox Co., 5.vii.71, det. A. H. Freeman, no. 35834 (TENN); Knoxville, 6.x.73, det. L. R. Hesler, no. 39058 (TENN); Knoxville, 20.v.76, det. A. H. Freeman, no. 40091 (TENN).

5. AGARICUS ARGENTEUS BRAENDLE IN PECK, Bull. Torrey Bot. Club 26: 68. 1899.

TYPE SPECIMEN (holotype, implicit): NYS, Washington, D.C., -.xi.-, coll. & det. F. J. Braendle, s.n. (!)

Stature of carpophore campestroid; mature pileus convex to plane, to 5 cm diam, pale grayish white or grayish brown (Braendle), dingy tan when dried; surface silky; dried flesh to 1 mm thick at disc, thinning at margin. Lamellae brownish

at first, never pink, deep chocolate brown when mature, free, to 4 mm deep. Stipe equal, to 3.5 cm long, appearing fibrous, concolorous with pileus, solid; ring superior, evanescent (Braendle).

Hyphae of pileus cuticle tightly interwoven, repent; pileocystidia lacking; hyphae of pileus flesh 4.5-23.0 μ m diam, occasionally inflated, without clamp connections, thin-walled. Lamellae trama irregular; hyphae 3.0-23.0 μ m diam, usually uninflated; basidia 6.0-9.2 x 15.3-29.0 μ m, 4-sterigmate, without clamp connections; cystidia lacking. Hyphae of stipe surface above ring 4.5-26.0 μ m diam, parallel, tightly packed. Hyphae of ring 3.0-12.2 μ m diam. Hyphae of universal veil (stipe surface near base) inflated, to 26.0 μ m diam, without clamp connections, thin-walled, hyaline.

Spores (7.5)9.2-13.0 x 6.0-7.5 μ m, ellipsoid to ovoid; wall dark brown, less than 0.6 μ m thick; apiculus papillate, hyaline or indiscernible.

Schaeffer macrochemical reaction: negative.

Observations: This is a most distinctive species due to the highly inflated universal veil tissue, very large spores and lack of cheilocystidia. Peck (1899) remarked that specimens were frequently associated with *Stropharia bilamellata*.

The species is found on lawns and in meadows and is reportedly edible and delicious. Its range extends as far north as Washington, D.C. and south to South Carolina, preferring, apparently, coastal plain areas.

Specimens examined:

Maryland: Prince Georges Co., 2.vii.73, det. KHM (as *Agaricus campestris*), no. KHM 13626 (BPI).

North Carolina: Highlands, 8.viii.66, det. A. H. Freeman, no. 29252 (TENN); Chapel Hill, 21.ix.14, coll. W.C. Coker, no. 1240 (NCU); Jackson Co., 3.viii.75, det. A. H. Freeman, no. 40070 (TENN); 25.ix.-, coll. W. C. Coker, no. 434 (NCU); Chapel Hill, 9.vii.14, coll. W. C. Coker, no. 1104 (NCU).

South Carolina: Winnsboro, 16.v.66, det. A. H. Freeman, no. 28985 (TENN); Fairfield Co., 18.v.66, det. A. H. Freeman, no. 29012 (TENN).

Tennessee: Knoxville, 17.xii.71, det. A. H. Freeman, no. 5147 (TENN); Knoxville, 4.xii.41, det. B. F. Isaacs (as *A. pampeanus*), no. 14090 (TENN); Great Smoky Mtn. Nat'l. Park, 24.v.42, det. A. H. Smith (as *A. argentatus*), no. 14211 (TENN); Knoxville, 29.x.49, det. B. F. Isaacs, no. 19495 (TENN); Knox Co., 25.xi.54, det. B. F. Isaacs, no. 21572 (TENN); Knoxville, 2.vi.55, det. B. F. Isaacs, no. 21690

(TENN); Oak Ridge, 16.x.66, det. A. H. Freeman, no. 29447 (TENN); Knoxville, 4.xii.41, det. A. H. Smith (as *A. argentatus*), no. F31330 (FLAS).

Washington, D.C.: -.xi.-, coll. & det. F. J. Braendle, s.n. (TYPE, NYS); 13.xi.30, coll. C. S. & A. L. Parker (as *Psalliota arvensis*), no. 2014 (BPI).

6. *AGARICUS RODMANII* PECK, N.Y. State Mus. Bull. 36: 45. 1844.

TYPE SPECIMEN (holotype, implicit): NYS, Astoria, L.I., no date, coll. W. Rodman, det. C. H. Peck, s.n. (!)

Stature of carpophore campestroid; mature pileus convex to plane, to 10 cm diam (Peck), white or whitish to yellowish on disc (Peck), dull tan when dried; surface smooth to slightly rimose-squamose on disc; dried flesh to 5 mm thick at disc, thinning to 1 mm at margin; margin decurved. Lamellae (mature) deep chocolate brown, free, to 2 mm deep. Stipe equal, to 7.5 cm long, appearing fibrous, concolorous with pileus, solid; ring median, flaring upward, dull tan when dried.

Hyphae of pileus cuticle loosely interwoven, usually repent; pileocystidia abundant, loosely fasciculate, 1.5-6.0 μ m diam, unbranched; hyphae of pileus flesh 3.8-21.5 μ m diam, inflated, without clamp connections, thin-walled. Lamella trama irregular; hyphae 2.3-10.7 μ m diam, occasionally slightly inflated; basidia 6.0-7.5 x 13.8-23.0 μ m, 4-sterigmate, without clamp connections; cystidia lacking. Hyphae of stipe surface above ring 3.0-10.7 μ m diam, parallel, tightly packed. Hyphae of ring 3.0-10.7 μ m diam. Hyphae of universal veil (stipe surface below ring) inflated, to 7.5 μ m diam, without clamp connections, thin-walled, hyaline.

Spores 6.0-7.5 x 4.5-7.0 μ m, ovoid to ellipsoid when immature, becoming globose to subglobose when mature; lacking germ pore (SEM); wall dark brown, 0.6 μ m thick; apiculus minutely papillate, hyaline.

Schaeffer macrochemical reaction: negative.

Observations: A very squat, thick-fleshed species, *A. rodmani* is remarkable for its preference for urban habitats. It differs from *A. campestris* in its lack of cheilocystidia and generally smaller spores. The nature of the ring is highly variable as also noted by Kauffman (1918) and Hotson & Stuntz (1938); at times it is distinctly double, appearing as two single rings, one just above the other, but at other times it appears to be single. There is no difference microscopically between the two forms.

The distribution of these specimens suggests that *A. rodmani* is a northern species whose range has extended southward. The species is edible and, according to Peck, equal

to *A. campestris* in flavor.

Specimens examined:

New York: Astoria, L.I., no date, det. C. H. Peck, s.n. (NYS, TYPE).

North Carolina: Chapel Hill, 17.x.12, coll. W. B. Cobb (as *A. campestris*), no. 587 (NCU).

Tennessee: Smoky Mtn. Nat'l Park, Elkmont, 2.xi.41, det. A. H. Freeman, no. 14051 (TENN).

Washington, D.C.: 14.ix.23, det. Dr. C. Thom., s.n. (BPI); 22.v.29, det. V. K. Charles, s.n. (BPI).

7. *AGARICUS COMPTULIFORMIS* MURRILL, *Mycologia* 14: 203. 1922.

TYPE SPECIMEN (holotype, explicit): NY, Auburn, Ala. 29.vii.99, coll. F. S. Earle, det. W. A. Murrill, s.n. (!)

Stature of carpophore campestroid; mature pileus convex to expanded, to 5 cm diam (Murrill), bright yellow, then white (Murrill), dull tan when dried; surface smooth; dried flesh to 3 mm thick at disc, thinning to < 1 mm at margin. Lamellae (mature) deep chocolate brown, free, to 3 mm deep. Stipe equal, to 5 cm long, appearing fibrous, white to tawny with more or less fibrous scales below ring (Murrill), concolorous with pileus when dried; ring superior, dull gold when dried.

Hyphae of pileus cuticle loosely interwoven, usually repent; pileocystidia 3.0-6.0 μ m diam, scattered, branched or unbranched; hyphae of pileus flesh 3.0-20.0 μ m diam, inflated, without clamp connections, thin-walled. Lamella trama irregular; hyphae 3.0-15.3 μ m diam, occasionally inflated; basidia 6.0-7.5 x 18.5-20.0 μ m, 4-sterigmate, without clamp connections; cystidia lacking. Hyphae of stipe surface above ring 3.0-15.3 μ m diam, parallel, tightly packed. Hyphae of ring 3.0-10.7 μ m diam. Universal veil hyphae (stipe surface below ring) slightly inflated, to 15.3 μ m diam, without clamp connections, thin-walled, hyaline.

Spores 4.5-6.0 x 3.0-4.5 μ m, ellipsoid to ovoid; wall dark brown, 0.6 μ m thick; apiculus a hyaline spot in the spore wall.

Schaeffer macrochemical reaction: negative.

Observations: *Agaricus comptuliformis*, like *A. campestris*, possesses uninflated or only slightly inflated universal veil tissue and a glabrous white pileus. *Agaricus comptuliformis*, however, lacks cheilocystidia and has much

smaller spores than *A. campestris*. The species is also very closely related to *A. sulphureiceps* from which *A. comptuliformis* differs primarily in possession of an equal stipe and broadly ellipsoid to ovoid spores.

The species is found in open wooded areas (*teste* Murrill). Its edibility is unknown. Current distribution includes mountainous and coastal plain areas (Alabama and Tennessee).

Specimens examined:

Alabama: Auburn, 29.vii.99, coll. F. S. Earle, det. W. A. Murrill, s.n. (NY, TYPE); Fusihatchie, 21.xi.42, det. A. H. Smith, s.n. (MICH).

Tennessee: Carter School, Knox Co., 7/10/34, det. B. F. Isaacs, no. 3947 (TENN); Knoxville, 13.vii.41, det. A. H. Smith, no. 13825 (TENN); Knoxville, 13.vi.51, det. B. F. Isaacs, no. 20051 (TENN); Knoxville, 10.vi.60, det. B. F. Isaacs, no. 23709 (TENN); Knoxville, 27.v.74, det. L. R. Hesler, no. 39214 (TENN).

8. AGARICUS SOLIDIPES PECK, Bull. Torrey Bot. Club 31: 180. 1904.

TYPE SPECIMEN (holotype, implicit): NYS, Denver, Colo., no date, coll. E. B. Sterling, det. C. H. Peck, s.n. (!)

Stature of carpophore campestroid; mature pileus convex, to 7 cm diam (Peck), white or whitish (Peck), pale cream when dried; surface squamose or rimose-squamose, scales imbricate, to 4 mm thick; dried flesh to 5 mm thick at disc, thinning to 1 mm at margin; margin involute. Lamellae (mature) deep chocolate brown, free, to 6 mm deep. Stipe equal, to 4 cm long, appearing fibrous, concolorous with pileus, solid; ring superior to appendiculate, cream colored when dried.

Hyphae of pileus cuticle tightly interwoven, repent; pileocystidia lacking; hyphae of pileus flesh highly inflated, to 27.5 μ m diam, without clamp connections, thin-walled. Lamella trama irregular; hyphae 3.0-4.5 μ m diam, irregularly inflated; basidia 4.5-7.5 x 20.0-23.0 μ m, 4-sterigmate, without clamp connections; cystidia lacking. Hyphae of stipe surface above ring 3.0-9.2 μ m diam. Hyphae of universal veil (stipe surface below ring) inflated, to 16.8 μ m diam, without clamp connections, thin-walled, hyaline.

Spores 7.5-12.2 x 6.0-7.5 μ m, subglobose to ellipsoid or ovoid; lacking germ pore (SEM); wall dark brown, 0.6 μ m thick; apiculus papillate to barely discernible, hyaline.

Schaeffer macrochemical reaction: negative.

Observations: Although somewhat resembling *A. campestris*, *A. solidipes* may be distinguished by its lack of cheilocystidia, imbricate cracking of the pileus and larger spores.

The species is found in meadows and is, according to Peck, edible. *Agaricus solidipes* currently has a rather disjunct distribution having been collected in Florida and Colorado; further collecting might solidify the distribution, but it may be that this is strictly a coastal plain and prairie species.

Specimens examined:

Colorado: Denver, no date, coll. E. B. Sterling, det. C. H. Peck, s.n. (NYS, TYPE).

Florida: Gainesville, 14.v.43, det. A. H. Smith, no. F1935 (MICH).

9. *AGARICUS SUBPONDEROSUS* MURRILL, Quart. J. Florida Acad. Sci. 8: 195. 1945.

TYPE SPECIMEN (holotype, explicit): FLAS, Gainesville, Fla., 4.xii.44, coll. & det. W. A. Murrill, no. 21775. (!) Isotype: TENN, no. 21107. (!)

Stature of carpophore robustly campestroid; mature pileus convex to plane, to 12 cm diam (Murrill), white (Murrill), gold when dried; surface squamulose; dried flesh to 12 mm thick around depressed disc, thinning to < 1 mm at margin; margin upturned with age. Lamellae (mature) deep chocolate brown, free, to 5 mm deep. Stipe equal, to 12 cm long, appearing fibrous, concolorous with pileus, solid; ring appendiculate, superior when adhering to stipe, gold when dried.

Hyphae of pileus cuticle interwoven, usually repent; pileocystidia loosely fasciculate or scattered, 2.3-6.0 μ m diam, usually unbranched; hyphae of pileus flesh 3.0-15.3 μ m diam, occasionally inflated, without clamp connections, thin-walled. Lamella trama irregular; hyphae 1.5-10.7 μ m diam, occasionally inflated; basidia 5.5-7.0 x 12.2-23.0 μ m, 4-sterigmate, without clamp connections; cystidia lacking. Hyphae of stipe surface above ring 3.0-13.8 μ m diam. Hyphae of universal veil (stipe surface below ring) uninflated or only slightly so, 3.0-6.0 μ m diam, without clamp connections, thin-walled, hyaline.

Spores 4.5-6.0 x 3.8-4.5 μ m, subglobose to ellipsoid or ovoid; wall dark brown, 0.6 μ m thick; apiculus indiscernible or a hyaline spot in the spore wall.

Schaeffer macrochemical reaction: negative.

Observations: This is a large, thick-fleshed species,

suggesting *A. campestris*, but lacking cheilocystidia, bearing floccose squamules and having smaller spores. From *A. praemagniceps*, *A. subponderosus* may be distinguished by its lack of multicellular cheilocystidia.

The species is found in shaded, grassy areas and is currently known only from Florida and Tennessee. Edibility is unknown.

Specimens examined:

Florida: Gainesville, 4.xii.44, coll. & det. W. A. Murrill, no. 21775 (FLAS, TYPE); Gainesville, 7/11/42, det. W. A. Murrill (as *Agaricus cylindriceps*), no. F22137 (FLAS).

Tennessee: Knoxville, 17.v.53, det. B. F. Isaacs, no. 20818 (TENN); Knoxville, 1.v.54, det. B. F. Isaacs, no. 21313 (TENN); Knoxville, 2.vi.57, det. B. F. Isaacs, no. 22581 (TENN); Knoxville, 27.v.61, det. B. F. Isaacs, no. 23748 (TENN); Knoxville, 22.v.72, det. L. R. Hesler, no. 36706 (TENN).

10. *AGARICUS CYLINDRICEPS* MURRILL VAR. *CYLINDRICEPS*, *Lloydia* 7: 323. 1944.

TYPE SPECIMEN (holotype, explicit): FLAS, Gainesville, Fla., 13.viii.37, coll. & det. W. A. Murrill, no. 16050. (!) Cotype: NY, no. F16050. (!)

Stature of carpophore caespitoid; young pileus convex-truncate, with flattened disc, not fully expanded at maturity, to 8 cm diam (Murrill), white or pale yellow-white (Murrill), dull gray-gold when dried; surface minutely squamulose; dried flesh to 6 mm thick at disc, thinning to < 1 mm at margin; margin inrolled. Lamellae (mature) deep chocolate brown, free, to 3 mm deep. Stipe bulbous, to 7.5 cm long, appearing fibrous, white (Murrill), gray when dried, solid; ring median to superior, gold when dried.

Hyphae of pileus cuticle interwoven, usually repent; pileocystidia usually unbranched, fasciculate or scattered, to 7.5 μ m diam; hyphae of pileus flesh 3.0-15.3 μ m diam, occasionally inflated, without clamp connections, thin-walled. Lamella trama irregular; hyphae 1.5-9.2 μ m diam, uninflated or only slightly so; basidia 4.5-7.0 x 12.2-24.5 μ m, 4-sterigmate, without clamp connections; cystidia lacking. Hyphae of stipe surface above ring 3.0-16.8 μ m diam. Hyphae of universal veil (stipe surface below ring) inflated slightly, to 7.0 μ m diam, without clamp connections, thin-walled, hyaline.

Spores 4.5-6.0 x 3.8-4.5 μ m, ovoid to ellipsoid; lacking germ pore (SEM); wall dark brown, 0.6 μ m thick; apiculus indiscernible.

Schaeffer macrochemical reaction: negative.

Observations: The convex-truncate nature of the immature pileus, which, even with age, never fully expands, serves to make this species easily identifiable. This shape of the pileus, the inrolled margin and campestroid stature are the species' most distinctive characteristics.

The species is found in grassy exposed areas (*teste* Murrill) and up to the present time is known only from Florida. Edibility is unknown.

Specimens examined:

Florida: Gainesville, 13.viii.37, coll. & det. W. A. Murrill, no. 16050 (FLAS, TYPE); Gainesville, det. R. Singer, no. F2080/I (MICH); Gainesville, 22.v.43, det. W. A. Murrill, s.n. (MICH); Gainesville, 27.v.43, det. W. A. Murrill, s.n. (MICH); Gainesville, det. W. A. Murrill, s.n. (MICH); Gainesville, 13.vi.42, det. W. A. Murrill, no. 16048 (TENN); Gainesville, 1.vi.44, det. W. A. Murrill, no. F8731 (FLAS); Gainesville, 4.vii.38, det. W. A. Murrill, no. F17350 (FLAS); Gainesville, 21.ix.41, det. W. A. Murrill, no. F9263 (FLAS); Gainesville, 6/2/38, det. W. A. Murrill, no. F16426 (FLAS); Gainesville, 19.vi.42, det. W. A. Murrill, s.n. (NYS); Gainesville, 21.vi.44, det. W. A. Murrill, s.n. (NCU); Gainesville, 14.viii.44, det. W. A. Murrill, s.n. (NCU); Gainesville, 26.xii.41, det. A. H. Smith (as *Agaricus bivelatus*), s.n. (MICH); Gainesville, -.43, det. A. H. Smith (as *A. bivelatus*), s.n. (MICH).

11. AGARICUS SULPHUREICEPS MURRILL, Quart. J. Florida Acad. Sci. 8: 195. 1945.

TYPE SPECIMEN (holotype, explicit): FLAS, Gainesville, Fla., 18.vi.44, coll. & det. W. A. Murrill, no. 38805 (!)

Stature of carpophore placomycetoid; mature pileus campanulate to expanded, to 4 cm diam (Murrill), sulphureous, slightly darker on the disc (Murrill), gold when dried; surface finely fibrillose; dried flesh 1 mm thick at disc, thinning at margin. Lamellae (mature) deep chocolate brown, free, to 1 mm deep. Stipe more or less bulbous, to 3.5 cm long, appearing fibrous, white (Murrill), concolorous with pileus when dried; ring superior, gold when dried.

Hyphae of pileus cuticle loosely interwoven; pileocystidia scattered, 3.0-4.5 μ m diam, unbranched; hyphae of pileus flesh 3.0-12.2 μ m diam, occasionally inflated, without clamp connections, thin-walled. Lamella trama irregular; hyphae 2.3-7.5 μ m diam, uninflated; basidia 6.0-7.5 x 12.2-26.0 μ m, 4-sterigmate, without clamp connections; cystidia lacking. Hyphae of stipe surface above ring 2.3-12.2 μ m diam, parallel, tightly packed. Hyphae of ring 1.5-9.2 μ m diam. Hyphae of universal veil (stipe surface below ring) uninflated or only slightly so, to 12.0 μ m diam,

without clamp connections, thin-walled, hyaline.

Spores 4.5-5.5(6.0) x (3.0)3.8 μ m, subglobose to broadly ellipsoid; wall dark brown, 0.6 μ m thick; apiculus minutely papillate or a hyaline spot in the spore wall.

Schaeffer macrochemical reaction: negative.

Observations: Although very closely related to *A. comptuliformis*, *A. sulphureiceps* may be distinguished by its bulbous stipe and subglobose spores. Murrill (1945) also compared the two species, but added that *A. sulphureiceps* differs also in color and habitat as well as stipe length and shape. Although the two species are very close, I believe the above differences, taken *in toto*, serve to separate two distinct taxa.

The species is found in open woodlands (*teste* Murrill) and up to the present time is known only from Florida. Edibility is unknown.

Specimens examined:

Florida: Gainesville, 18.vi.44, coll. & det. W. A. Murrill, no. 38805 (FLAS, TYPE); Gainesville, 25.ix.51, det. W. A. Murrill, no. F45880 (FLAS); Gainesville, 16.vi.49, det. W. A. Murrill, no. F8810 (FLAS); Gainesville, 21.ix.51, det. W. A. Murrill, no. F45882 (FLAS); Gainesville, 12.ix.50, det. W. A. Murrill, no. F 45884 (FLAS); Gainesville, 8.viii.44., det. W. A. Murrill, no. F8929 (FLAS); Gainesville, 18.vi.44, det. W. A. Murrill, no. 21108 (TENN).

Subgenus *Lanagaricus* Heinem. emend. Freeman

Flore Icon. des Champ. du Congo, Fasc. 5: 114. 1956.

≡ *Agaricus* subgen. *Euagaricus* Pilát, Acta Mus. Nat. Pragae 7B(1): 27. 1951. (p.p.)

≡ *Agaricus* subgen. *Psalliota* Konrad & Maublanc, Rev. Hymeno. de France, 58. 1924-1937. (p.p.)

Type Species: *Agaricus trisulphuratus* Berk.¹

¹*Agaricus trisulphuratus* Berkeley, Ann. Mag. Nat. Hist., Ser. 5: xv, 386. 1885.

Type Specimen (holotype, explicit): K, Zanzibar, 6.xi.84, coll. & det. Berkeley, s.n.

Stature of carpophore placomycetoid; pileus convex to slightly umbonate, 1.0 cm diam, gold when dried; surface inconspicuously tufted-scaly; dried flesh < 1.0 mm thick at disc, thinning at margin. Lamellae (mature) deep chocolate brown, free. Stipe 1.5 cm long, equal to slightly bulbous,

Stature of fruit bodies usually placomycetoid (pileus diameter divided by stipe length ratio < 1); stipe usually bulbous; annulus usually well-developed; universal veil cellular (Fig. 1B), consisting of regularly inflated, barrel-shaped cells, or irregularly inflated or diverticulate cells; species generally fruiting in wooded areas.

Observations: As in subgenus *Agaricus*, emendation of this subgenus is based on emphasis of the universal veil tissue and omission of the chemical tests conducted by Heinemann. Because *A. triculphuratus* falls within the limits of my subgeneric circumscription, my emendation has not significantly altered Heinemann's concept.

Key to Species

1. Stature campestroid 2
1. Stature placomycetoid 11
 2. Cheilocystidia absent 3
 2. Cheilocystidia present 8
3. Pileus surface bearing colored scales 4
3. Pileus surface silky or if scaly then the scales
concolorous with pileus surface 6
 4. Spores 6.0-7.5 x 3.8-4.5 μm ; pileus to 18 cm
diam; stipe to 10 cm long 12. *A. praemagnus* Murr.
 4. Spores and fruit body smaller than above . . . 5

appearing fibrous, concolorous with pileus; ring median, evanescent, gold when dried.

Hyphae of stipe above ring 1.5-12.2 μm diam, parallel, tightly packed. Hyphae of ring 4.6-12.2 μm diam. Cells of universal veil (stipe surface below ring) to 10.7 μm diam, regularly inflated, without clamp connections, thin-walled, hyaline.

Spores (4.6)5.4(6.0) x 3.8(4.6) μm , broadly ellipsoid to ovoid; apiculus indiscernible or a hyaline spot in the spore wall.

Schaeffer macrochemical reaction: negative.

Note: This description is incomplete because only a single small carpophore, whose pileal tissues were indiscernible, was made available for study.

5. Universal veil cells highly inflated, to 46.0 μm diam; pileus to 8 cm diam, disc glabrous; spores 4.5-6.0 x 3.8-4.5(6.0) μm 13. *A. pseudoplacomyces* Murr.
5. Universal veil cells not highly inflated, to 28.5 μm diam; pileus to 4.5 cm diam, gold with gold appressed fibrillose scales when dried; spores 4.5-6.0 x 3.0-4.5 μm 14. *A. nobelianus* Freeman
6. Spores 6.0-7.5 x 4.5-6.0 μm ; pileus to 9 cm diam, margin projecting; stipe bulbous, to 7 cm long 15. *A. xanthodermoides* Murr.
6. Spores generally smaller than above 7
7. Ring superior, thick, persistent; spores 5.3-7.0 x 4.5-5.3 μm ; pileus to 9 cm diam, margin projecting 16. *A. blazei* Murr.
7. Ring median to superior, more or less evanescent; spores 4.5-6.0 x 3.8-4.5 μm ; pileus to 7 cm diam, margin slightly inrolled 17. *A. auricolor* Krieger ss. Coker
8. Cheilocystidia multicellular, scattered, to 6.0 μm diam; pileus to 15 cm diam, with fibrils on the disc; stipe bulbous, to 10 cm long; spores (4.5)5.3-6.0 x 3.8-4.5 μm 18. *A. praemagniceps* Murr.
8. Cheilocystidia not as above 9
9. Pileus imbricate-scaly on disc, to 10 cm diam; margin projecting 1 mm, more or less inrolled; stipe equal, to 7 cm long; spores 6.0-7.5 x 4.5-6.0 μm diam; cheilocystidia scattered, napiform, brown, 10.7-15.3 μm diam 19. *A. alligator* Murr.
9. Pileus not as above, spores smaller than above . . 10
10. Universal veil cells irregularly inflated, to 18.5 μm diam; spores 5.5-6.0 x 3.8-4.5 μm ; pileus convex, not fully expanded, to 6.5 cm diam, smooth to fibrillose; stipe to 6 cm long 20. *A. alabamensis* Murr.
10. Universal veil cells regularly inflated (barrel-shaped), to 15.3 μm diam; spores 6.0-6.8 x 4.5-5.3 μm ; pileus broadly convex to plane, occasionally rimose-areolate, to 15 cm diam; stipe to 10 cm long 21. *A. floridanus* Pk.
11. Cheilocystidia present 12
11. Cheilocystidia absent 16
12. Spores 7.5-9.2 x (4.5)5.3(6.0) μm ; pileus to 7 cm diam; stipe bulbous, to 8 cm long; surface appressed silky fibrillose to scaly

- on disc; lamella edge sterile with broadly clavate to napiform cheilocystidia, 7.5-17.5 μm diam 22. *A. arvensis* var. *palustris* Smith
12. Spores smaller than above 13
13. Fruit body small; pileus to 4 cm diam, stipe bulbous, to 4 cm long; surface covered with imbricate purple scales; cheilocystidia napiform, to 9.2 μm diam; spores 4.5-6.0 x 3.0-3.8 μm 23. *A. alachuanus* Murr.
13. Fruit body larger than above 14
14. Pileus surface covered with fine gray to smoky appressed fibrillose scales, to 11 cm diam; stipe bulbous, to 11 cm long; cheilocystidia broadly clavate to napiform, 7.2-10.0 μm diam; spores (4.3)5.0-5.7 x 2.8-3.5 μm 24. *A. praeclaresquamosus* nom. nov.
14. Pileus surface not as above 15
15. Pileus densely brown fibrillose-scaly, to 8 cm diam; pileocystidia 7.0-13.8 μm diam; stipe equal to slightly bulbous, to 5 cm long; cheilocystidia scattered, napiform, to 20.0 μm diam; spores 4.5-5.5(6.0) x 3.0-3.8 μm 25. *A. rubribrunnescens* Murr.
15. Pileus squamulose, to 12 cm diam; stipe bulbous, to 10 cm long; cheilocystidia scattered, broadly capitate to napiform, to 6.0 μm diam; spores (4.5)5.5-6.0(8.5) x 3.0-4.5 μm 26. *A. badius* Freeman
16. Fruit body small, pileus usually less than 4 cm diam 17
16. Fruit body larger than above 21
17. Universal veil cells irregularly inflated, to 14.0 μm diam; spores 4.5-5.3(6.0) x 3.8 μm ; pileus to 1.5 cm diam, fibrillose on disc; stipe to 3.5 cm long, equal to slightly bulbous 27. *A. diminutivus* Pk.
17. Universal veil cells regularly inflated (barrel-shaped), spores larger than above 18
18. Pileus squamulose, to 3.5 cm diam, margin slightly inrolled; stipe equal to tapering upward, to 3 cm long; spores 6.0-7.0 x 4.5 μm 28. *A. subalachuanus* Murr.
18. Pileus minutely scaly or fibrillose, to 2.5 cm diam, margin even 19

19. Pileus minutely scaly, isabelline, becoming tan to dull brown when dried; stipe to 3.0 cm long; spores 4.5-7.0 x 3.0-4.5 μm 29. *A. subcomptulus* Murr.
19. Pileus fibrillose, not scaly 20
20. Ring superior, thick, mobile when dried; pileus grayish when fresh; spores 6.0-7.0 x 3.8-4.5 μm 30. *A. hannonii* Freeman
20. Ring superior, evanescent, not mobile when dried; pileus cream-yellow when fresh; spores 4.5-6.0(7.0) x 3.8-4.5 μm 31. *A. tantulus* Freeman
21. Pileus innately brown-fibrillose, not scaly . . . 22
21. Pileus squamulose or smooth 23
22. Spores 6.0-8.5 x 5.3-6.0 μm ; pileus to 5 cm diam; stipe equal, to 4 cm long 32. *A. subhortensis* Murr.
22. Spores 5.3-6.0 x 3.8-4.5 μm ; pileus to 6.5 cm diam; stipe bulbous, to 8 cm long . . 33. *A. rhoadsii* Murr.
23. Pileus appressed fibrillose-squamulose, to 15 cm diam, becoming gold when dried; stipe abruptly bulbous, to 10 cm long, often with one to three rhizomorphic strands; spores 5.5-6.0 x 3.8-4.5 μm 34. *A. aurescens* Freeman
23. Pileus squamulose, spores larger than above . . . 24
24. Spores 4.5-7.5(9.2) x 3.8-5.3 μm ; size of fruit body variable; pileus to 15 cm diam, always very thick-set; stipe bulbous, to 10 cm long 35. *A. subrufescens* Pk.
24. Fruit bodies smaller than above 25
25. Ring obviously double, the partial veil forming a discrete roll of tissue on the lower surface of the marginal veil; pileus to 10 cm diam, minutely scaly; stipe bulbous, to 8 cm long; spores 4.5-6.0 x 3.0-3.8 μm 36. *A. pocillator* Murr.
25. Ring not as above 26
26. Universal veil cells irregularly inflated . . 27
26. Universal veil cells regularly inflated (barrel-shaped) 28
27. Pileus squamulose, to 7.5 cm diam; stipe bulbous, often with one or two rhizomorphic strands attached to the base, to 12.5 cm long; spores 4.5-6.0 x 3.0-

- 3.8(4.5) μm 37. *A. placomyces* Pk.
27. Pileus smooth, to 6.5 cm diam; stipe abruptly bulbous, the bulb often somewhat flattened on top, to 12.5 cm long; spores 6.0-7.5 x 4.5 μm 38. *A. abruptibulbus* Pk.
28. Stipe broad at base, tapering upward, to 5 cm long, pileus conic to truncate-convex, with fibrillose scales, to 7 cm diam; spores 4.5-6.0 x 3.8-4.5 μm 39. *A. blockii* Murr.
28. Stipe not as above 29
29. Pileus convex, depressed in center, slightly squamulose, to 5 cm diam; stipe distinctly bulbous, to 3 cm long; spores 4.5-6.0 x 3.8-4.5 μm 40. *A. citrinidiscus* Murr.
29. Pileus not depressed in center 30
30. Margin projecting to 5 mm, inrolled; pileus occasionally minutely floccose, to 8 cm diam; spores (4.5)6.0-7.5 x 3.8-5.3 μm 41. *A. projectellus* Murr.
30. Margin not projecting; pileus broadly umbonate, to 8 cm diam, squamulose; spores 4.5-6.0 x 4.5-5.5 μm 42. *A. subarvensis* Murr.

12. AGARICUS PRAEMAGNUS MURRILL, Mycologia 10: 78. 1918.

TYPE SPECIMEN (holotype, explicit): NY, Cuba, 13.v.04, coll. F. S. Earle, det. W. A. Murrill, no. 18. (!)

Stature of carpophore campestroid; mature pileus convex to expanded, to 18 cm diam (Murrill), avellaneous to dirty-white or yellowish with minute appressed avellaneous or brownish scales (Murrill), dull gold with gray tinges and grayish scales when dried; dried flesh to 7 mm thick at disc, thinning to < 1 mm at margin. Lamellae (mature) deep chocolate brown, free, to 5 mm deep. Stipe more or less bulbous, to 10 cm long, appearing fibrous, dirty-white (Murrill), dull gray-gold when dried; ring superior, dull gold when dried.

Hyphae of pileus cuticle loosely interwoven; pileocystidia 3.0-10.7 μm diam, loosely fasciculate or scattered, unbranched; hyphae of pileus flesh 4.5-15.3 μm diam, inflated, without clamp connections, thin-walled. Lamella trama irregular; hyphae 2.3-16.8 μm diam, occasionally inflated; basidia 5.5-6.0 x 12.2-20.0 μm , 4-sterigmate, without clamp connections; cystidia lacking. Hyphae of stipe surface above ring 3.0-16.8 μm diam, parallel, tightly packed. Hyphae of ring 3.8-12.2 μm diam. Cells of universal veil (stipe surface below ring) inflated, to

20.0(29.0) μm diam, without clamp connections, thin-walled, hyaline.

Spores 6.0-7.5 x 3.8-4.5 μm , ovoid to broadly ellipsoid; wall dark brown, 0.6 μm thick; apiculus indiscernible or a hyaline spot in the spore wall.

Schaeffer macrochemical reaction: negative.

Observations: Of studied species with cellular universal veil tissue and campestroid stature but lacking cheilocystidia, *A. praemagnus* is not only larger overall, but can be distinguished most obviously by its dark colored, appressed, fibrillose scales. It is also interesting to note the range of this species; first described from Cuba, it has since been found in Florida and as far north as Tennessee.

The species is found in grassy areas (*teste* Murrill). Edibility is unknown.

Specimens examined:

Cuba: 13.v.04, coll. F. S. Earle, det. W. A. Murrill, no. 18 (NY, TYPE).

Florida: Gainesville, 20.vii.45, det. B. F. Isaacs, no. 21109 (TENN).

Tennessee: Knoxville, 11.x.37, det. B. F. Isaacs, no. 10883 (TENN); Knoxville, 11.viii.49, det. B. F. Isaacs, no. 19221 (TENN); Knoxville, 7.x.56, det. B. F. Isaacs, no. 22443 (TENN).

13. *AGARICUS PSEUDOPLACOMYCES* MURILL, Quart. J. Florida Acad. Sci. 8: 194. 1945.

TYPE SPECIMEN (holotype, explicit): FLAS, Gainesville, Fla., 24.v.44, coll. & det. W. A. Murrill, no. 20483. (!)

Stature of carpophore placomycetoid; mature pileus convex to plane, to 8 cm diam (Murrill), surface covered except on disc with purple-brown scales (Murrill), brown when dried; dried flesh to 1 mm thick at disc, thinning at margin. Lamellae (mature) deep chocolate brown, free, to 3 mm deep. Stipe bulbous or equal, to 5 cm long, appearing fibrous, white (Murrill), concolorous with pileus when dried; ring superior, gold when dried.

Hyphae of pileus cuticle interwoven, usually repent; pileocystidia tightly fasciculate, to 9.2 μm diam, unbranched; hyphae of pileus flesh 4.5-21.5 μm diam, inflated, without clamp connections, thin-walled. Lamella trama irregular; hyphae 2.3-12.2 μm diam, uninflated; basidia 6.0-9.2 x 10.7-15.3 μm , 4-sterigmate, without clamp connec-

tions; cystidia lacking. Hyphae of stipe surface above ring 4.5-20.0 μm diam, parallel, tightly packed. Hyphae of ring 4.5-15.3 μm diam. Cells of universal veil (stipe surface below ring) inflated, to 30.0(46.0) μm diam, without clamp connections, thin-walled, hyaline.

Spores 4.5-6.0 x 3.8-4.5(6.0) μm , subglobose to ovoid; lacking germ pore (SEM); wall dark brown, 0.6 μm thick; apiculus indiscernible.

Schaeffer macrochemical reaction: negative.

Observations: Murrill (1945) adequately distinguished *A. pseudoplacomyces* from *A. placomyces* by remarking that *A. pseudoplacomyces* exhibited a shorter stipe, wider spores, and smaller, less persistent scales than *A. placomyces*. *Agaricus pseudoplacomyces* is also almost campestroid in stature, but is very thin-fleshed and generally bears a bulb at the stipe base. The color of the scales and their tendency to be lost, squat stature, highly inflated universal veil tissue and wider spores all serve to distinguish this species.

The species is found in open woodlands (*teste* Murrill) and up to the present time is known only from Florida. Edibility is unknown.

Specimens examined:

Florida: Gainesville, 24.v.44, coll. & det. W. A. Murrill, no. 20483 (FLAS, TYPE); Gainesville, 20.iv.44, det. W. A. Murrill, no. F18435 (FLAS); Gainesville, 20.vi.44, det. W. A. Murrill, no. 21106 (TENN); Gainesville, 5.vii.44, det. W. A. Murrill, no. F45896 (FLAS).

14. AGARICUS NOBELIANUS FREEMAN, SP. NOV.

TYPE SPECIMEN (holotype): FLAS, Gainesville, Fla., -.-.50, coll. & det. W. A. Murrill, no. 19146. (!)
 Topotype: FLAS, -.-.51, coll. & det. W. A. Murrill, no. 45904. (!)
 [= *A. nobelianus* Murrill, *nom. herb.*]

Stature campestroidia; pileo convexo mox plano, 4.5 cm diam, fusco, summo squameo; stipito bulboso, 5.5 cm longo; annulo superiore; cheilocystidiis absentes; cellulis integumentorum universorum-28.5 μm diam; sporis 4.5-6.0 x 3.0-4.5 μm .

Stature of carpophore campestroid; mature pileus convex to subexpanded, to 4.5 cm diam, dull gold-brown with dark golden brown scales when dried; dried flesh to 4 mm thick at disc, thinning to <1 mm at margin; margin projecting 2 mm. Lamellae (mature) deep chocolate brown, free, to 3 mm deep. Stipe slightly bulbous, to 5 cm long, appearing fibrous, concolorous with pileus when dried; ring super-

ior, membranous, gold-brown when dried.

Hyphae of pileus cuticle loosely interwoven, usually repent; pileocystidia fasciculate, 3.5-14.3 μm diam, usually unbranched; hyphae of pileus flesh 6.0-15.3 μm diam, occasionally inflated, without clamp connections, thin-walled. Lamella trama irregular; hyphae 3.0-6.0 μm diam, uninflated; basidia 6.0 x 13.8-16.8 μm , 4-sterigmate, without clamp connections; cystidia lacking. Hyphae of stipe surface above ring 3.0-12.2 μm diam, parallel, tightly packed. Hyphae of ring 4.5-9.2 μm diam. Cells of universal veil (stipe surface below ring) inflated, to 28.5 μm diam, without clamp connections, thin-walled, hyaline.

Spores 4.5-6.0 x 3.0-4.5 μm , subglobose to ellipsoid or ovoid; wall dark brown, 0.6 μm thick; apiculus minutely papillate, hyaline.

Schaeffer macrochemical reaction: negative.

Observations: To the best of my knowledge, Murrill never published a description of this taxon. The taxon is distinct and Murrill's original name is retained in acknowledgement of his recognition of the species.

The species is close to *A. praemagnus*, but may be distinguished from the latter by its smaller overall size and smaller spores; from *A. pseudoplaecomycetes*, *A. nobelianus* is distinguished by its golden scales, less highly inflated universal veil tissue and slightly smaller spores.

Of several collections other than the type and topotype, all were in too poor condition for positive identification. The type collection consists of a single mature fruit body and brief notes by Murrill; the topotype contains two mature specimens.

Range, habitat preference and edibility are unknown.

15. *AGARICUS XANTHODERMOIDES* MURRILL, Quart. J. Florida Acad. Sci. 8: 195. 1945.

TYPE SPECIMEN (holotype, explicit): FLAS, Gainesville, Fla., 25.iii.44, coll. & det. W. A. Murrill, no. 22503. (!) Cotype: TENN, no. 16056. (!)

Stature of carpophore delicately campestroid; pileus convex, then expanded, to 9 cm diam, white (Murrill), dull gray-tan when dried; surface silky to slightly scaly; dried flesh to 4 mm thick at disc, thinning to < 1 mm at margin; margin projecting 3 mm. Lamellae (mature) deep chocolate brown, free, to 4 mm deep. Stipe slightly bulbous, to 7 cm long, appearing fibrous, pubescent (Murrill), concolorous with pileus when dried, solid; ring appendiculate, superior when adhering to stipe, dull gold when dried.

Hyphae of pileus cuticle loosely interwoven; pileocystidia fasciculate or scattered, 3.0-7.5 μm diam, unbranched; hyphae of pileus flesh 4.5-23.0 μm diam, occasionally inflated, without clamp connections, thin-walled. Lamella trama irregular; hyphae 2.3-13.8 μm diam, occasionally inflated; basidia 6.0-7.5 x 13.8-23.0 μm , 4-sterigmate, without clamp connections; cystidia lacking. Hyphae of stipe surface above ring 4.5-20.0 μm diam, parallel, tightly packed. Hyphae of ring 2.3-12.2 μm diam. Cells of universal veil (stipe surface below ring) inflated, to 29.0 μm diam, without clamp connections, thin-walled, hyaline.

Spores 6.0-7.5 x 4.5-6.0 μm , globose to broadly ellipsoid; wall dark brown, slightly greater than 0.6 μm thick; apiculus indiscernible or merely a hyaline spot in the spore wall.

Schaeffer macrochemical reaction: negative.

Observations: This species is one of several exhibiting campestroid stature and cellular universal veil tissue but lacking cheilocystidia. From *A. praemagnus*, *A. xantho-dermoides* may be distinguished primarily by its smaller size and from *A. blazei* by its smaller spores. Murrill noted that the cuticle turns yellow in KOH; this is apparently only observed on fresh material.

The species may be found in open grassy areas (*teste* Murrill). Up to the present time, its distribution is limited to coastal plain regions.

Specimens examined:

Alabama: Auburn, l.viii.55, det. B. F. Isaacs, no. 21947 (TENN).

Florida: Gainesville, 25.viii.44, coll. & det. W. A. Murrill, no. 22503 (FLAS, TYPE); Gainesville, 18.iv.44, det. W. A. Murrill, s.n. (BPI); Gainesville, 28.iv.43, det. W. A. Murrill (as *Agaricus subarvensis*), no. 21104 (TENN).

South Carolina: Winnsboro, 16.v.66, det. A. H. Freeman, no. 28467 (TENN).

16. AGARICUS BLAZEI MURRILL, Quart. J. Florida Acad. Sci. 8: 193. 1945.

TYPE SPECIMEN (holotype, explicit): FLAS, Gainesville, Fla., 24.iv.44, coll. R. W. Blaze, det. W. A. Murrill, no. 32911. (!) Cotype: NY, s.n. (!)

Stature of carpophore campestroid; mature pileus subcylindric to subexpanded, to 9 cm diam (Murrill), cream to ochraceous (Murrill), dull gold when dried; surface finely scaly; dried flesh to 11 mm thick at disc, thinning to 1 mm at margin; margin projecting 1 mm. Lamellae (mature)

deep chocolate brown, free, to 3 mm deep. Stipe equal to sub-bulbous, to 6 cm long, appearing fibrous, concolorous with pileus; ring superior, membranous, dull gold when dried.

Hyphae of pileus cuticle interwoven, usually repent; pileocystidia loosely fasciculate, 3.0-6.0 μm diam, branched or unbranched; hyphae of pileus flesh 3.0-16.8 μm diam, occasionally inflated, without clamp connections, thin-walled. Lamella trama irregular; hyphae 3.0-12.2 μm diam, occasionally inflated; basidia 5.5-9.2 x 15.3-26.0 μm , 4-sterigmate, without clamp connections, cystidia lacking. Hyphae of stipe surface above ring 3.0-20.0 μm diam, parallel, tightly packed. Hyphae of ring 1.5-10.7 μm diam. Cells of universal veil (stipe surface below ring) inflated, to 26.0 μm diam, without clamp connections, thin-walled, hyaline.

Spores (4.5)5.3-7.0 x (3.8)4.5-5.3 μm , subglobose to ovoid or broadly ellipsoid; lacking germ pore (SEM); wall dark brown, 0.6 μm thick; apiculus indiscernible or a hyaline spot in the spore wall.

Schaeffer macrochemical reaction: negative.

Observations: *Agaricus blazei* is one of several species with campestroid stature and cellular universal veil tissue, but lacking cheilocystidia. From *A. praemagnus* it may be distinguished by its smaller size, thicker flesh, projecting margin and delicate scales which are concolorous with the pileus surface. The spores are also somewhat smaller. From *A. xanthodermoides* it differs in its more robust stature and smaller spores.

The species is found in open grassy areas (*teste* Murrill); its current distribution is limited to coastal plain areas of Florida and South Carolina. Edibility is unknown.

Specimens examined:

Florida: Gainesville, 24.iv.44, coll. R. W. Blaze, det. W. A. Murrill, no. 32911 (FLAS, TYPE); Gainesville, 25.vi.42, det. R. Singer (as *Agaricus subfloridanus*), no. F9784 (FLAS); Gainesville, 4/7/39, det. W. A. Murrill (as *A. subfloridanus*), no. F19635 (FLAS); Gainesville, 30.iv.50, det. W. A. Murrill (as *A. blazei minor*), no. F17664 (FLAS); Gainesville, 9.vii.51, det. W. A. Murrill, no. F45918 (FLAS); Gainesville, 20.ix.44, det. W. A. Murrill, no. F45909 (FLAS); Gainesville, 24.iii.51, det. W. A. Murrill, no. F45928 (FLAS); Gainesville, 1.viii.52, det. W. A. Murrill, no. F45929 (FLAS); Gainesville, 29.vi.52, det. W. A. Murrill, no. F45917 (FLAS); Gainesville, 5/12/44, det. W. A. Murrill, no. F9008 (FLAS); Gainesville, 27.v.43, det. W. A. Murrill (as *A. cylindriceps*), no. F19258 (FLAS); Gainesville, 17.viii.51, det. W. A. Murrill, no. F45926 (FLAS); Gainesville, 2.vii.52, det. W. A. Murrill, no.

F45924 (FLAS); Gainesville, 21.vii.51, det. W. A. Murrill, no. F45922 (FLAS); Gainesville, 10.viii.51, det. W. A. Murrill, no. F45925 (FLAS); Gainesville, 13.ix.50, det. W. A. Murrill (as *A. blazei minor*), no. F45923 (FLAS); Gainesville, 14.vii.52, det. W. A. Murrill, no. F45927 (FLAS); Gainesville, 30.vi.51, det. W. A. Murrill, no. F45916 (FLAS); Gainesville, 29.v.48, det. W. A. Murrill (as *A. blazei minor*), no. F45908 (FLAS); Gainesville, 26.viii.51, det. W. A. Murrill, no. 21102 (TENN); Gainesville, 21.vii.50, det. W. A. Murrill, s.n. (BPI); Gainesville, 7/2/50, det. W. A. Murrill, s.n. (BPI); Gainesville, 9.ix.54, det. J. A. Stevenson, s.n. (BPI).

South Carolina: Caesar's Head, 16.vii.38, det. W. C. Coker (as *A. amygdalinus*), no. F45913 (FLAS); Winnsboro, 23.v.66, det. A. H. Freeman, no. 29018 (TENN).

17. AGARICUS AURICOLOR KRIEGER SS. COKER

($\equiv$ *A. amygdalinus* Curtis *vide* Coker, *nom. herb.*)

Stature of carpophore campestroid or placomycetoid; mature pileus convex to plane, to 7 cm diam, dull gold when dried; surface smooth to slightly gold squamulose; dried flesh to 4 mm thick at disc, thinning to < 1 mm at margin; margin slightly inrolled. Lamellae (mature) deep chocolate brown, free, to 3 mm deep. Stipe slightly bulbous, to 7 cm long, appearing fibrous, flocculose near base, concolorous with pileus; ring median to superior, dull gold when dried; odor when fresh of peach kernels (Coker).

Hyphae of pileus cuticle interwoven, usually repent; pileocystidia scattered, 2.3-5.5 μ m diam, unbranched; hyphae of pileus flesh 3.0-16.8 μ m diam, occasionally inflated, thin-walled, without clamp connections. Lamella trama irregular; hyphae 3.0-8.5 μ m diam, occasionally slightly inflated; basidia 6.0-7.0 x 15.3 x 18.5 μ m, 4-sterigmate, without clamp connections; cystidia lacking. Hyphae of stipe surface above ring 3.8-13.8 μ m diam, parallel, tightly packed. Hyphae of ring 3.0-12.2 μ m diam. Cells of universal veil (stipe surface below ring) inflated, to 18.5 μ m diam, without clamp connections, thin-walled, hyaline.

Spores 4.5-6.0 x 3.8-4.5 μ m, subglobose to ovoid; wall dark brown, 0.6 μ m thick; apiculus indiscernible.

Schaeffer macrochemical reaction: negative.

Observations: All of the collections from NCU had been labeled *A. amygdalinus* by Coker, but in 1928 he synonymized the name under *A. auricolor* Krieger, the type of which I have not seen. This species appears to be most readily distinguishable in the fresh state by its very strong odor of peach kernels. When dried, the species resemble dried

specimens of *A. abruptibulbus*, but it is generally campes-troid in stature, bears considerably smaller spores and exhibits distinctly cellular, not highly inflated univer-sal veil tissue. Also, unlike *A. abruptibulbus*, *A. auri-color* tends to be slightly squamulose on the pileus surface.

Edibility is unknown.

Specimens examined:

North Carolina: Chapel Hill, 31.v.19, coll. W. C. Coker, no. 3274 (NCU); Highlands, 16.vii.38, coll. W. C. Coker, no. 10826 (NCU); Chapel Hill, 7.ix.15, coll. H. R. Totten, no. 1692 (NCU); Chapel Hill, 31.v.19, coll. W. C. Coker, no. 3209 (NCU); Chapel Hill, 8.vii.14, coll. W. C. Coker, no. 1099 (NCU); Chapel Hill, 28.ix.14, coll. W. C. Coker, no. 1279 (NCU); Chapel Hill, 27.vii.15, coll. H. R. Totten, no. 1650 (NCU); Chapel Hill, 24.ix.14, coll. W. C. Coker, no. 1259 (NCU); Chapel Hill, 7.vi.15, coll. W. C. Coker, no. 1542 (NCU); Chapel Hill, 6.vii.14, coll. W. C. Coker, no. 1092 (NCU); Chapel Hill, 12.vii.14, coll. W. C. Coker, no. 1125 (NCU).

18. *AGARICUS PRAEMAGNICEPS* MURRILL, J. Elisha Mitchell Sci. Soc. 54: 140. 1938.

TYPE SPECIMEN (holotype, explicit): FLAS, Gainesville, Fla., 15.viii.37, coll. & det. W. A. Murrill, no. 16051. (!)

Stature of carpophore campestroid; mature pileus cylindric-truncate to convex, expanded, depressed over the disc, to 15 cm diam (Murrill), avellaneous when young, becoming pallid with age (Murrill), gray-gold, brown on the disc when dried; surface smooth with the exception of minute avellaneous fibrils on the disc; dried flesh 3-5 mm thick around the depressed disc, thinning to < 1 mm at the margin; margin more or less inrolled. Lamellae (mature) deep chocolate brown, free, to 5 mm deep. Stipe bulbous, to 10 cm long, appearing fibrous, white (Murrill), concolorous with the pileus when dried; ring more or less appendiculate, superior when adhering to stipe, dull gold when dried.

Hyphae of pileus cuticle loosely interwoven, usually repent; pileocystidia locally abundant (on disc), loosely fasciculate or scattered, 2.3-7.0 μ m diam, usually unbranched; hyphae of pileus flesh 3.0-20.0 μ m diam, occasionally inflated, without clamp connections, thin-walled. Lamella trama irregular; hyphae 2.3-13.8 μ m diam, occasionally inflated; basidia 5.5-7.5 x 15.3-21.5 μ m, 4-sterigmate, without clamp connections; cheilocystidia scattered, catenulate chains of 2-3-4 cells, to 6.0 μ m diam, thin-walled. Hyphae of stipe surface above ring 3.0-18.5 μ m diam, parallel, tightly packed. Hyphae of ring 3.0-13.8 μ m diam. Cells of univer-

sal veil (stipe surface below ring) inflated, to 26.0 μm diam, without clamp connections, thin-walled, hyaline.

Spores 4.5-6.0 x 3.8-4.5 μm , broadly ellipsoid to ovoid; lacking germ pore (SEM); wall dark brown, less than 0.6 μm thick; apiculus indiscernible or merely a hyaline spot in the spore wall.

Schaeffer macrochemical reaction: negative.

Observations: Of several species exhibiting campestroid stature, cellular universal veil tissue and bearing cheilocystidia, *A. praemagniceps* alone bears multicellular cheilocystidia and therefore can be easily distinguished.

The species is found in open woodlands (*teste* Murrill) and up to the present time has been found only in Florida. Murrill reported it "disappointing" from the standpoint of the mycophagist.

Specimens examined:

Florida: Gainesville, 15.viii.37, coll. & det. W. A. Murrill, no. 16051 (FLAS, TYPE); Gainesville, det. W. A. Murrill, no. F8980 (FLAS); Gainesville, 12.ii.49, det. W. A. Murrill, no. F45892 (FLAS); Marion Co., 8/10/39, det. W. A. Murrill, no. F19907 (FLAS); Sugarfoot, 4/11/43, det. W. A. Murrill, no. F10249 (FLAS); Gainesville, 26.xii.41, det. A. H. Smith, no. F19565 (FLAS); Gainesville, 31.v.47, det. W. A. Murrill, no. F8766 (FLAS); Gainesville, --.43, det. A. H. Smith, s.n. (MICH); Gainesville, 17.v.43, det. A. H. Smith (as *Agaricus sylvicola*), no. F1955A (MICH); Gainesville, 14.vi.39, det. W. A. Murrill, no. 16052 (TENN).

19. AGARICUS ALLIGATOR MURRILL, Quart. J. Florida Acad. Sci. 8: 193. 1945.

TYPE SPECIMEN (holotype, explicit): FLAS, Gainesville, Fla., 17.x.41, coll. & det. W. A. Murrill, no. 19566.
(!) Cotype: TENN, no. 21101. (!)

Stature of carpophore campestroid; mature pileus convex to expanded, to 10 cm diam (Murrill), white (Murrill), yellowing when handled (Murrill), dull gray-gold when dried; surface silky, imbricate-scaly on disc; dried flesh to 7 mm thick at disc, thinning to 1 mm at margin; margin projecting 1 mm. Lamellae (mature) deep chocolate brown, free, to 5 mm deep. Stipe equal, to 7 cm long, appearing fibrous, concolorous with pileus, yellowing when handled (Murrill), solid; ring median, more or less appendiculate, gray-gold when dried.

Hyphae of pileus cuticle loosely interwoven, usually repent; pileocystidia 3.8-6.0 μm diam, irregularly inflated, branched, loosely fasciculate; hyphae of pileus flesh 3.0-

16.8 μm diam, inflated, without clamp connections, thin-walled. Lamella trama irregular; hyphae 3.0-10.0 μm diam, occasionally inflated; basidia 7.5 x 9.2-15.3 μm , 4-sterigmate, without clamp connections; cheilocystidia scattered, napiform, brownish, 10.7-15.3 μm diam. Hyphae of stipe surface above ring 4.5-13.8 μm diam, parallel, tightly packed. Hyphae of ring 3.0-11.5 μm diam. Cells of universal veil (stipe surface below ring) inflated, to 15.3 μm diam, without clamp connections, thin-walled, hyaline.

Spores 6.0-7.5 x 4.5-6.0 μm , ovoid to broadly ellipsoid; wall dark brown, 0.6 μm thick; apiculus indiscernible.

Schaeffer macrochemical reaction: negative.

Observations: *A. alligator*, along with *A. floridanus* and *A. alabamensis*, combines the campestroid stature and cellular universal veil tissue with the presence of cheilocystidia. This species is, however, readily distinguishable by the small, imbricate scales which cover the pileus, particularly the disc, and which gave the species its name. Murrill (1945) also compared the species to *A. floridanus*, distinguishing *A. alligator* by its scaly surface, and added that unlike *A. floridanus*, the pileus and stipe became yellowed where bruised or handled.

The species is found in open grassy areas (*teste* Murrill) and appears to be restricted to the coastal plain region. Edibility is unknown.

Specimens examined:

Alabama: Tuscaloosa, 19.viii.52, det. A. H. Freeman, no. 20638 (TENN).

Florida: Gainesville, 17.x.41, coll. & det. W. A. Murrill, no. 19566 (FLAS, TYPE).

20. *AGARICUS ALABAMENSIS* MURRILL, *Mycologia* 14: 202. 1922.

TYPE SPECIMEN (neotype, *des. mihi*): TENN, no. 10182, Gainesville, Fla., 7.vii.48, det. B. F. Isaacs.

Stature of carpophore campestroid; mature pileus convex, not fully expanded, to 6.5 cm diam, white (Murrill), dull gold when dried; surface smooth to fibrillose; dried flesh to 7 mm thick at disc, thinning to < 1 mm at margin; margin projecting 2 mm. Lamellae (mature) deep chocolate brown, free, to 3 mm deep. Stipe tapering upward, to 6 cm long, slightly bulbous, appearing fibrous, concolorous with pileus; ring superior, persistent, thicker near margin, dull gold when dried.

Hyphae of pileus cuticle loosely interwoven, repent; pileocystidia lacking; hyphae of pileus flesh 3.0-24.5 μm

diam, inflated, without clamp connections, thin-walled. Lamella trama irregular; hyphae 3.0-21.5 μ m diam, occasionally inflated; basidia 6.0-7.5 x 13.8-23.0 μ m, 4-sterigmate, without clamp connections; cheilocystidia scattered, broadly clavate to napiform, to 12.2 μ m diam. Hyphae of stipe surface above ring 3.0-26.0 μ m diam, parallel, tightly packed. Hyphae of ring 3.0-18.5 μ m diam. Cells of universal veil (stipe surface below ring) inflated, to 18.5 μ m diam, without clamp connections, thin-walled, hyaline.

Spores 5.5-6.0 x 3.8-4.5 μ m, broadly ellipsoid; wall dark brown, 0.6 μ m thick; apiculus indiscernible.

Schaeffer macrochemical reaction: negative.

Observations: Of several species combining the campestroid stature with cellular universal veil tissue and bearing napiform cheilocystidia, *A. alabamensis* is unique in that it lacks the imbricate scales on the pileus which characterize *A. alligator* and, unlike *A. floridanus*, the pileus never becomes rimosely areolate. The spores of *A. alabamensis* are also much smaller than either of the others. Murrill (1922) compared this species to *A. campestris*, but said it differed by having a longer stipe and smaller spores; the species does outwardly resemble *A. campestris*, but microscopically it is distinct.

The species is found in open grass in coastal plains areas. Edibility is unknown.

Specimens examined:

Alabama: Montgomery, --.42, det. A. H. Smith, s.n. (MICH).

Florida: Gainesville, Fla., 7.vii.48, det. B. F. Isaacs, no. 10182 (TENN, TYPE).

South Carolina: Winnsboro, 7.v.66, coll. C. Lyles (as *Agaricus* sp.), no. 27562 (TENN).

21. AGARICUS FLORIDANUS PECK, N.Y. State Mus. Bull. 150: 50. "1910" (1911).

TYPE SPECIMEN (holotype, implicit): NYS, DeFuniak Springs, Fla., 29.iii.10, coll. G. Clyde Fisher, det. C. H. Peck, s.n. (!) Isotype: FLAS, no. 45919. (!)

Stature of carpophore campestroid; mature pileus broadly convex to plane, to 15 cm diam (Peck), whitish with a yellow or yellowish center (Peck), dull gray-gold when dried; surface rimose-areolate to slightly strigose, becoming glabrous; dried flesh to 1 cm thick at disc, thinning to < 1 mm at margin. Lamellae (mature) deep chocolate brown,

free, to 4 mm deep. Stipe equal to bulbous, to 10 cm long, appearing fibrous, ochraceous at base (Murrill), solid; ring superior, appendiculate on young specimens, dull gray-gold when dried.

Hyphae of pileus cuticle loosely interwoven, usually repent; pileocystidia loosely fasciculate to scattered, 3.8-4.5 μ m diam, unbranched; hyphae of pileus flesh 4.5-20.0 μ m diam, inflated, without clamp connections, thin-walled. Lamella trama irregular; hyphae 2.3-10.7 μ m diam, uninflated; basidia 6.0-7.5 x 13.8-24.5 μ m, 4-sterigmate, without clamp connections; cheilocystidia napiform, scattered, 12.2-18.5 μ m diam, thin-walled. Hyphae of stipe surface above ring 3.0-15.3(30.5) μ m diam, parallel, tightly packed. Hyphae of ring 3.0-10.7 μ m diam. Cells of universal veil (stipe surface below ring) inflated, to 30.5 μ m diam, without clamp connections, thin-walled, hyaline.

Spores (5.5)6.0-7.5 x (3.8)4.5-5.3 μ m, broadly ellipsoid to ovoid; lacking germ pore (SEM); wall dark brown, 0.6 μ m thick; apiculus minute to indiscernible, hyaline.

Schaeffer macrochemical reaction: negative.

Observations: *Agaricus floridanus*, one of several species combining the characters of campestroid stature and cellular universal veil tissue with the presence of napiform cheilocystidia, is readily distinguishable by its thick-fleshed pileus, which is often rimose-areolate. Murrill recognized the species in the field by its ochraceous stipe base.

The species is found in open grassy field with sandy soil (*teste* Murrill); it is currently known only from Florida. Edibility is unknown.

Specimens examined:

Florida: DeFuniak Springs, 29.iii.10, coll. G. Clyde Fisher, det. C. H. Peck (NYS, s.n., TYPE; FLAS, no. 45919, ISOTYPE); Gainesville, 2.iv.71, det. J. W. Kimbrough, no. F49096 (FLAS); Newberry Rd., 22.ii.39, det. W. A. Murrill, no. F18535 (FLAS); Gainesville, 22.ii.44, det. W. A. Murrill, no. F32688 (FLAS); Gainesville, 24.ii.45, det. W. A. Murrill, no. 45905 (FLAS); Gainesville, 24.iii.38, det. W. A. Murrill, no. F16064 (FLAS); Gainesville, 4/10/38, det. W. A. Murrill, no. F16200 (FLAS); Gainesville, 19.iii.44, det. W. A. Murrill, no. F18448 (FLAS); Gainesville, 3/1/44, det. W. A. Murrill, no. 20573 (FLAS); Gainesville, 27.iv.43, det. A. H. Smith, s.n. (MICH); Gainesville, 24.iii.38, det. W. A. Murrill, s.n. (MICH); F19339 (MICH); Gainesville, 19.iii.44, det. W. A. Murrill, no. 16049 (TENN); Winter Park, 21.iii.42, det. V. K. Charles, s.n. (BPI).

22. *AGARICUS ARVENSIS* VAR. *PALUSTRIS* SMITH, Pap. Mich. Acad. Sci. Arts, Let. 25: 117. "1939" (1940).

TYPE SPECIMEN (holotype, explicit); MICH, Kent Lake, Mich., 13.ix.37, coll. & det. A. H. Smith, s.n. (!)

Stature of carpophore placomycetoid; mature pileus broadly umbonate or convex to plane, to 35 cm diam (Smith), white, creamy or yellowish on the disc (Smith), uniformly gold when dried; surface appressed silky fibrillose to scaly on disc (Smith); dried flesh to 6 mm thick at disc, thinning to < 1 mm at margin. Lamellae (mature) deep chocolate brown, free, to 2 mm deep. Stipe bulbous, to 30 cm long (Smith), appearing fibrous, gray-gold when dried, hollow or stuffed; ring superior, gray-gold when dried.

Hyphae of pileus cuticle loosely interwoven; pileocystidia 3.0-7.5 μ m diam, branched, scattered; hyphae of pileus flesh 4.5-15.3 μ m diam, inflated, without clamp connections, thin-walled. Lamella trama irregular; hyphae 3.0-20.0 μ m diam, inflated; basidia 7.5-9.2 x 20.0-30.5 μ m, 4-sterigmate, without clamp connections; cheilocystidia broadly clavate to napiform, 7.5-17.5 μ m diam, fasciculate or forming a sterile band along entire gill edge. Hyphae of stipe surface above ring 3.0-23.0 μ m diam, parallel, tightly packed. Hyphae of ring 3.0-10.7 μ m diam. Cells of universal veil (stipe surface below ring, lower surface of ring) inflated, to 15.3 μ m diam, without clamp connections, thin-walled, hyaline.

Spores (7.0)7.5-9.2 x (4.5)5.3-6.0 μ m, ovoid to pyriform; lacking germ pore (SEM); wall dark brown, 0.6 μ m thick; apiculus minutely papillate, hyaline.

Schaeffer macrochemical reaction: negative.

Observations: This species is remarkable for its large cheilocystidia and spores which distinguish it immediately from other near-glabrous, placomycetoid species.

The species is found in swampy areas. Originally described from Michigan, it has since been found in Alabama and Florida. Edibility is unknown.

Specimens examined:

Alabama: Sipsey Swamp, Tuscaloosa Co., 8/9/52, det. A. H. Freeman, no. 20626 (TENN).

Florida: Gainesville, 8.vii.51, det. W. A. Murrill (as *Agaricus sulphureiceps*), no. F45881 (FLAS).

Michigan: Kent Lake, 13.ix.37, coll. & det. A. H. Smith, s.n. (MICH, TYPE).

23. AGARICUS ALACHUANUS MURRILL, J. Elisha Mitchell Sci. Soc. 54: 140. 1938.

TYPE SPECIMEN (holotype, explicit): FLAS, Gainesville, Fla., 17.viii.37, coll. & det. W. A. Murrill, no. 15917. (!).

Stature of carpophore placomycetoid; mature pileus convex or slightly depressed, to 4 cm diam, isabelline with imbricate purple scales (Murrill), deep tan with brown scales when dried; dried flesh to 2 mm thick at disc, thinning to < 1 mm at margin. Lamellae (mature) deep chocolate brown, free, to 2 mm deep. Stipe bulbous, to 4 cm long, appearing fibrous, concolorous with pileus; ring median, flaring, gold when dried.

Hyphae of pileus cuticle loosely interwoven, usually repent; pileocystidia loosely fasciculate, 2.3-7.5 μ m diam, irregularly inflated, unbranched; hyphae of pileus flesh 4.5-26.0 μ m diam, occasionally inflated, without clamp connections, thin-walled. Lamella trama irregular; hyphae 3.0-12.2 μ m diam, slightly inflated; basidia 6.0-8.5 x 10.7-23.0 μ m, 4-sterigmate, without clamp connections; cheilocystidia sparse, saccate to napiform, to 9.2 μ m diam. Hyphae of stipe surface above ring 3.0-18.5 μ m diam. Cells of universal veil (stipe surface below ring) inflated, to 20 μ m diam, without clamp connections, thin-walled, hyaline.

Spores 4.5-6.8 x 3.0-4.5 μ m, broadly ellipsoid to subglobose; lacking germ pore (SEM); wall dark brown, 0.6 μ m thick; apiculus minutely papillate or indiscernible, hyaline.

Schaeffer macrochemical reaction: negative.

Observations: Of several small (pileus less than 4.0 cm diam) species of *Agaricus* exhibiting placomycetoid stature and a squamulose pileus surface, *A.alachuanus* alone bears cheilocystidia and is therefore easily identifiable.

The species may be found in open woods (*teste* Murrill) and is currently known only from Florida. Edibility is unknown, but its small size renders it impractical in this regard.

Specimens examined:

Florida: Gainesville, 17.viii.37, coll. & det. W. A. Murrill, no. 15917 (FLAS, TYPE); Gainesville, 30.viii.39, det. W. A. Murrill (as *Agaricus subalachuanus*), no. 16054 (TENN); Gainesville, 5.ix.43, det. W. A. Murrill, no. 18446 (TENN); Gainesville, 9/6/38, det. W. A. Murrill, no. F18206 (FLAS); Gainesville, 15.vii.44, det. W. A. Murrill, no. F8983 (FLAS); Gainesville, 9/6/43, det. W. A. Murrill, no. F8885 (FLAS); Gainesville, 10/2/38, det. W. A. Murrill, no. F18386 (FLAS); Gainesville, 9/5/43, det. W. A. Murrill, no. F8742 (FLAS); Gainesville, 19.vii.44, det. W. A. Murrill, s.n. (NYS); Gainesville, 8.viii.44, det. W. A. Murrill, s.n. (NCU); Gainesville, 5.ix.43, det. W. A. Murrill, s.n. (BPI).

24. AGARICUS PRAECLARESQUAMOSUS FREEMAN, NOM. NOV.

≡ *Agaricus meleagris* J. Schaeffer. Zeitschr. f. Pilzk. 4: 28. 1925. [non *A. meleagris* Sow. ex Berkeley. Outl. Brit. Fung. 101. 1860].

Stature of carpophore placomycetoid; mature pileus convex, then expanded, to 11 cm diam, white, ivory, or gray, surface covered with fine gray to smoky black, appressed, fibrillose scales, disc solid gray, pileus drying yellow-cream with gray scales and brownish disc; dried flesh to 5 mm thick at disc, thinning to < 1 mm at margin. Lamellae (mature) deep chocolate brown, free, to 3 mm deep. Stipe bulbous, to 11 cm long, appearing fibrous, concolorous with pileus; ring superior, occasionally somewhat floccose below, cream to dull brown when dried.

Hyphae of pileus cuticle loosely interwoven, usually repent; pileocystidia fasciculate or scattered, 2.3-11.5 µm diam, occasionally inflated, branched or unbranched; hyphae of pileus flesh 3.0-18.5 µm diam, inflated, without clamp connections, thin-walled. Lamella trama irregular; hyphae variable, 2.0-20.0 µm diam, occasionally inflated; basidia 5.5-7.0 x 13.0-23.0 µm, 4-sterigmate, without clamp connections; cheilocystidia scattered, 7.2-12.2 µm diam, broadly clavate to napiform. Hyphae of stipe surface above ring 2.3-14.3 µm diam, parallel, tightly packed. Hyphae of ring 3.0-13.8 µm diam. Cells of universal veil (stipe surface below ring) inflated, to 30.5 µm diam, without clamp connections, thin-walled, hyaline.

Spores variable, (4.3)5.0-5.7(7.5) x 2.8-3.5(4.5) µm, ellipsoid to ovoid; wall dark brown, 0.6 µm thick; apiculus minutely papillate, hyaline.

Schaeffer macrochemical reaction: negative.

Observations: Although I have not examined European specimens, Pilát's (1951) and Schaeffer's descriptions and photographs are a sufficient circumscription of the taxon for identification of the species. The species is distinctive for its coloration and delicate nature of the scales on the pileus surface, resembling those of *A. pocillator*.

The species is found in mixed woods; its current North American range extends from Maryland to Florida. Edibility is unknown.

Specimens examined:

Florida: Gainesville, 18.v.43, det. A. H. Smith (as *Agaricus micromegethus*), no. F1963, F1962 (MICH).

Kentucky: Cumberland St. Pk. 22.x.55, det. B. F. Isaacs (as *A. sylvaticus*), no. 22192 (TENN).

Maryland: Riggs Woods, 17.viii.55, det. J. A. Stevenson

(as *A. abruptibulbus*), s.n. (BPI).

North Carolina: Highlands, 17.vii.55, det. B. F. Isaacs (as *A. sylvaticus*), no. 21885 (TENN).

Tennessee: GSMNP, 8/11/36, det. B. F. Isaacs (as *A. sylvaticus*), no. 9287 (TENN); GSMNP, 6/8/37, det. B. F. Isaacs (as *A. sylvaticus*), no. 10398 (TENN); GSMNP, 6/10/44, det. B. F. Isaacs (as *A. sylvaticus*), no. 16388 (TENN); GSMNP, Cades Cove, 12.viii.75, det. A. H. Freeman, no. 40332 (TENN); Univ. Tenn. woodlot, 1.x.75, det. A. H. Freeman, no. 40333 (TENN); Univ. Tenn. woodlot, 1.x.75, det. A. H. Freeman, no. 40334 (TENN); Univ. Tenn. woodlot, det. A. H. Freeman, no. 40335 (TENN); Univ. Tenn. woodlot, 5.x.75, det. A. H. Freeman, no. 40336 (TENN); Univ. Tenn. woodlot, 1.x.75, det. A. H. Freeman, no. 40337 (TENN); GSMNP, Roaring Fork, 29.viii.75, det. A. H. Freeman, no. 40338 (TENN); GSMNP, Elkmont, det. C. H. Kauffman (as *Psalliota placomyces*), s.n. (MICH); GSMNP, Elkmont, 3.ix.37, det. Hesler & Smith (as *A. placomyces*), s.n. (MICH).

25. AGARICUS RUBRIBRUNNESCENS MURRILL, Mycologia 14: 216. 1922.

TYPE SPECIMEN (holotype, explicit): NY, N.Y., 8.ix.16, coll. & det. W. A. Murrill, s.n. (!)

Stature of carpophore placomycetoid; mature pileus convex to expanded, to 8 cm diam (Murrill), white with reddish scales (Murrill), brown with darker brown scales when dried; dried flesh to 3 mm thick at disc, thinning to < 1 mm at margin. Lamellae (mature) deep chocolate brown, free, to 3 mm deep. Stipe equal to more or less bulbous, to 5 cm long, appearing fibrous; ring superior, gold when dried.

Hyphae of pileus cuticle interwoven, usually repent; pileocystidia fasciculate, 3.8-13.8 μ m diam, unbranched, brown; hyphae of pileus flesh 3.8-38.3 μ m diam, inflated, without clamp connections, thin-walled. Lamellae trama irregular; hyphae 3.0-21.5 μ m diam, occasionally inflated; basidia 4.5-7.0 x 15.3-21.5 μ m, 4-sterigmate, without clamp connections; cheilocystidia scattered, napiform, to 20.0 μ m diam. Hyphae of stipe surface above ring 3.0-27.5 μ m diam, parallel, tightly packed. Hyphae of ring 3.8-10.7 μ m diam. Cells of universal veil (stipe surface below ring) inflated, to 24.5 μ m diam, without clamp connections, thin-walled, hyaline.

Spores 4.5-5.5(6.0) x 3.0-3.8 μ m, ellipsoid or broadly ellipsoid; wall dark brown, 0.6 μ m thick; apiculus indiscernible or a hyaline spot in the spore wall.

Schaeffer macrochemical reaction: negative.

Observations: This species is remarkable for its conspicuously scaly surface and large napiform cheilocystidia. In the fresh condition, the scales are tufts of more or less

erect hyphae; upon drying, however, the pileus surface resembles that of *A. placomyces*.

The species is found in mixed woods; it seems to be a northern species with a range extension into the southern mountains. Edibility is unknown.

Specimens examined:

New York: 8.ix.16, coll. & det. W. A. Murrill, s.n. NY, TYPE).

North Carolina: Chapel Hill, 4.vii.49, coll. W. C. Coker (as *Psalliota silvatica*), no. 14531 (NCU); Chapel Hill, 10.ix.15, det. A. H. Freeman, no. 1731 (NCU); Five Points, 13.ix.74, det. R. L. Shaffer (as *Agaricus sanguinarius*), s.n. (MICH); Indian Creek Rd., 8.viii.75, det. A. H. Freeman, no. 40088 (TENN); GSMNP, Kephart Trail, 8.viii.75, det. A. H. Freeman, no. 40087 (TENN).

Tennessee: Greenbriar, Sevier Co., 18.x.36, det. A. H. Freeman, no. 9573 (TENN); Cades Cove, 12.vii.41, det. A. H. Freeman, no. 13806 (TENN); Nale's Creek, 21.ix.57, det. A. H. Freeman, no. 19557 (TENN); Knoxville, 23.ix.51, det. A. H. Freeman, no. 20162 (TENN); Cades Cove, 20.viii.64, det. A. H. Freeman, no. 26312 (TENN); Knox Co., 8.x.72, det. A. H. Freeman, no. 37546 (TENN); Cades Cove, 14.viii.75, det. A. H. Freeman, no. 40089 (TENN); Univ. Tenn. woodlot, 1.x.75, det. A. H. Freeman, no. 40090 (TENN).

Virginia: Lynchburg, 11.ix.26, det. W. A. Murrill (as *Agaricus diminutivus*), no. F10156 (FLAS); Blacksburg, 14.x.73, det. A. H. Freeman, no. OKM9589 (VPI).

Washington, D.C.: 7.ix.36, det. C. S. & A. L. Parker, no. 4734 (BPI); 19.vii.12, det. F. J. V. (as *A. placomyces*), s.n. (BPI).

26. AGARICUS BADIUS FREEMAN STAT. NOV.

≡ *A. subplacomyces* var. *badius* Murrill. nom. illeg.
≡ *A. placomyces* var. *badius* Murrill. nom. herb.

TYPE SPECIMEN (holotype, explicit): FLAS, Gainesville, Fla., 7.vi.38, coll. & det. W. A. Murrill, no. 16402.
(!) Isotypes: NY, no. 16402 (!); NCU, s.n. (!); BPI, s.n. (!).

Stature of carpophore placomycetoid; mature pileus convex to plane, to 12 cm diam (Murrill), white with bay disc and scales (Murrill), dull gold with brown disc and scales when dried; surface heavily squamulose on disc, becoming glabrous near the margin; dried flesh to 2 mm thick at disc, thinning to < 1 mm at margin. Lamellae (mature) deep chocolate brown, free, to 3 mm deep. Stipe bulbous, to 10 cm long, glabrous above the ring, floccose below, white

(Murrill), concolorous with pileus when dried, stuffed to hollow; ring more or less appendiculate, superior when adhering to stipe, gold when dried; odor fragrant (Murrill).

Hyphae of pileus cuticle loosely interwoven; pileocystidia fasciculate or scattered, 3.0-10.0 μ m diam, unbranched; hyphae of pileus flesh 4.5-24.5 μ m diam, occasionally inflated, without clamp connections, thin-walled. Lamella trama irregular; hyphae 2.3-13.0 μ m diam, occasionally inflated; basidia 6.0-7.5 x 15.3-21.5 μ m, 4-sterigmate, without clamp connections; cheilocystidia napiform to broadly capitulate, 5.5-6.0 μ m diam, scattered. Hyphae of stipe surface above ring 4.5-13.8 μ m diam, parallel, tightly packed. Hyphae of ring 3.0-13.8 μ m diam. Cells of universal veil (stipe surface below ring) inflated, to 15.3 μ m diam, without clamp connections, thin-walled, hyaline.

Spores 4.5-6.0 x 3.0-4.5 μ m, ellipsoid to broadly ellipsoid or ovoid; wall dark brown, 0.6 μ m thick; apiculus minutely papillate or a hyaline spot in the spore wall.

Schaeffer macrochemical reaction: negative.

Observations: Although this species outwardly resembles *A. placomyces*, it is distinct. *Agaricus badius* is distinguished by the presence of cheilocystidia, which *A. placomyces* lacks, and universal veil cells which are smaller and more regularly barrel-shaped than those of *A. placomyces*. *Agaricus badius* also differs from *A. placomyces* by exhibiting a shorter, thicker stipe, bay color of the pileus and scales and, as Murrill noted, by having a fragrant odor.

The species is found in open, shady areas (*teste* Murrill) and up to the present time is known only from Florida. According to Murrill, it is of excellent flavor.

Specimens examined:

Florida: Gainesville, 7.vi.38, coll. & det. W. A. Murrill, no. 16402 (FLAS, TYPE); Gainesville, 29.iv.43, det. R. Singer (as *Agaricus placomyces* var. *badius*), no. F1887 (MICH); Gainesville, 25.vii.69, det. J. Kimbrough (as *A.alachuanus*), no. F48665 (FLAS); Gainesville, 25.x.38, det. W. A. Murrill (as *A. placomyces badius*), no. F19256 (FLAS); Sugar foot, 6/5/38, det. W. A. Murrill (as *A. placomyces badius*), no. F16279 (FLAS); Gainesville, 13.v.50, det. W. A. Murrill (as *A. placomyces badius*), no. 15600 (FLAS); Gainesville, 8/9/37, det. W. A. Murrill (as *A. subplacomyces* var. *badius*), no. 16050 (TENN).

27. AGARICUS DIMINUTIVUS PECK, Buffalo Soc. Nat. Sci. 1: 53. 1873.

TYPE SPECIMEN (holotype, implicit): NYS, Croghan, N.Y., -.ix.72, coll. & det. C. H. Peck, s.n. (!)

Stature of carpophore placomycetoid; mature pileus plane to slightly umbonate or depressed in center, to 1.5 cm diam, alutaceous (Peck), gray-tan when dried; surface spotted with appressed fibrillose scales; dried flesh to 1 mm thick at disc, thinning at margin. Lamellae (mature) deep chocolate brown, free, to 1 mm deep. Stipe to 3.5 cm long, slightly bulbous to equal, concolorous with pileus, hollow or stuffed; ring superior, thin, membranous, pale tan when dried.

Hyphae of pileus cuticle interwoven, repent; pileo-cystidia loosely fasciculate to scattered, 1.5-6.0 μ m diam, unbranched; hyphae of pileus flesh 3.0-23.0 μ m diam, occasionally inflated, without clamp connections, thin-walled. Lamella trama irregular; hyphae 3.0-23.0 μ m diam, inflated; basidia 4.5-6.8 x 12.2-18.5 μ m, 4-sterigmate, without clamp connections; cystidia lacking. Hyphae of stipe surface above ring 3.0-20.0 μ m diam, parallel, tightly packed. Hyphae of ring 1.5-7.5 μ m diam. Cells of universal veil (stipe surface below ring) inflated, to 14.0 μ m diam, without clamp connections, thin-walled, hyaline.

Spores 4.5-5.3 x 3.8 μ m, ellipsoid to ovoid or subglobose; lacking germ pore (SEM); wall dark brown, 0.6 μ m thick; apiculus papillate to barely discernible, hyaline.

Schaeffer macrochemical reaction: positive or negative.

Observations: One of several very small, placomycetoid taxa with appressed fibrillose scales on the pileus surface, *A. diminutivus* may be distinguished from *A. subalachuanus* by both its smaller overall size and smaller spores. From *A. suboreades* it may be distinguished by its cellular universal veil tissue. *Agaricus diminutivus* lacks cheilocystidia, which are present in *A.alachuanus*, and from *A. subcomptulus* it differs in its smaller size and larger, more numerous scales.

Coker remarked that this species stains white paper bluish or greenish; I hold to his concept of the taxon, but no other authors have mentioned this phenomenon in the literature and I have not observed it. It is possible that the taxon consists of a series of physiological races, some staining paper, some reacting to the Schaeffer reagent, which may be separated by chemical analysis.

The species may be found in mixed woods; it appears to be a northern species which has extended its range southward.

Edibility is unknown, but its small size renders it impractical in this regard.

Specimens examined:

Florida: Gainesville, 11/9/32, det. W. A. Murrill, no. F10161 (FLAS); Gainesville, 11/8/32, det. W. A. Murrill, no. F10160 (FLAS).

New York: Croghan, -.ix.72, coll. & det. C. H. Peck, s.n. (NYS, TYPE).

North Carolina: 2.viii.26, coll. Coker & party, no. 8144 (NCU); Haywood Co. 6.viii.26, coll. Coker & party, no. 8043 (NCU); Blowing Rock, 17.viii.22, coll. J. N. Couch, no. 5518 (NCU); 26.ix.12, coll. Cobb & Totten, no. 438 (NCU); Chapel Hill, 21.ix.44, det. A. H. Freeman, no. 13601 (NCU); Chapel Hill, 26.v.22, coll. W. C. Coker (as *Agaricus placomyces*), no. 5157 (NCU); Chapel Hill, 21.ix.44, det. A. H. Freeman, no. 13599 (NCU); Asheville, --.11, det. H. C. Beardslee Jr. (as *Psalliota gracilis*), s.n. (MICH); --.11, det. H. C. Beardslee Jr. (as *P. gracilis*), s.n. (MICH); Cashiers, 27.viii.67, det. A. H. Freeman, no. 29908 (TENN).

Tennessee: Cades Cove, 18.x.47, det. A. H. Smith, no. 18168 (TENN); Knoxville, 21.ix.52, det. A. H. Freeman, no. 20612 (TENN); Knoxville, 12.vii.56, det. B. F. Isaacs, no. 22317 (TENN).

28. AGARICUS SUBALACHUANUS MURRILL, Lloydia 5: 151. 1942.

TYPE SPECIMEN (holotype, explicit): FLAS, Gainesville, Fla., 29.viii.39, coll. & det. W. A. Murrill, no. 19900. (!) Isotype: NY, s.n. (!)

Stature of carpophore placomycetoid; mature pileus convex to subumbonate, to 3.5 cm diam (Murrill), white with rosy-avellaneous scales (Murrill), gray-gold when dried; dried flesh to 1 mm thick at disc, thinning to 1 mm at margin; margin more or less inrolled. Lamellae white to pink (Murrill), deep chocolate brown when mature, free, to 2 mm deep. Stipe equal to somewhat bulbous, to 3 cm long, appearing fibrous, concolorous with pileus; ring superior when adhering to stipe, appendiculate, cream colored when dried.

Hyphae of pileus cuticle interwoven, usually repent; pileocystidia scattered or fasciculate, 3.8-7.5 μ m diam, usually unbranched; hyphae of pileus flesh 3.0-15.3 μ m diam, occasionally inflated, without clamp connections, thin-walled. Lamella trama irregular; hyphae 2.3-15.3 μ m diam, occasionally inflated; basidia 6.0-7.5 x 13.8-29.0 μ m, 4-sterigmate, without clamp connections; cystidia lacking. Hyphae of stipe surface above ring 3.0-18.5 μ m diam, parallel, tightly packed. Hyphae of ring 2.3-6.0 μ m diam. Cells of universal veil (stipe surface below ring) inflated, to 23.0 μ m diam, without clamp connections, thin-walled, hyaline.

Spores 6.0-7.0 x 4.5 μ m, broadly ellipsoid; lacking germ pore (SEM); wall dark brown, 0.6 μ m thick; apiculus minutely papillate to indiscernible, hyaline.

Schaeffer macrochemical reaction: negative.

Observations: Of several small species (pileus less than 4.0 cm diam) exhibiting placomycetoid stature, a scaly pileus, cellular universal veil tissue and lacking cheilocystidia, *A. subalachuanus* is larger overall and bears larger spores. This difference in spore size is the most distinctive feature.

The species may be found in open grassy areas (*teste* Murrill); it appears to be restricted to coastal plain and low elevation mountainous regions. Edibility is unknown.

Specimens examined:

Florida: Gainesville, 29.viii.39, coll. & det. W. A. Murrill, no. 19900 (FLAS, TYPE); Gainesville, 21.ix.44, det. W. A. Murrill, s.n. (BPI); Gainesville, 21.ix.44, det. W. A. Murrill, s.n. (NCU); Gainesville, 30.viii.39, det. W. A. Murrill, no. F19920 (FLAS); Gainesville, 11.viii.44, det. W. A. Murrill, no. 20056 (TENN).

Tennessee: Knoxville, 18.ix.57, det. B. F. Isaacs, no. 14434 (TENN); Knoxville, 16.viii.49, det. B. F. Isaacs, no. 19136 (TENN).

29. AGARICUS SUBCOMPTULUS MURRILL, Quart. J. Florida Acad. Sci. 8: 194. 1945.

TYPE SPECIMEN (holotype, explicit): FLAS, Gainesville, Fla., 2.vii.38, coll. & det. W. A. Murrill, no. 17335. (!)

Stature of carpophore placomycetoid; mature pileus convex to expanded or broadly umbonate, to 2.5 cm diam (Murrill), isabelline, rosy-isabelline on umbo (Murrill), tan to brown when dried; surface minutely scaly; dried flesh 1.5 mm thick at disc, thinning to < 1 mm at margin; margin upturned in age. Lamellae (mature) deep chocolate brown, free, to 1.5 mm deep. Stipe bulbous, to 3 cm long, appearing fibrous, white (Murrill), brown when dried; ring superior, gold when dried.

Hyphae of pileus cuticle loosely interwoven, usually repent; pileocystidia loosely fasciculate or scattered, 2.3-6.0 μ m diam, unbranched; hyphae of pileus flesh 3.0-20.0 μ m diam, occasionally inflated, without clamp connection, thin-walled. Lamella trama irregular; hyphae 3.0-15.3 μ m diam, occasionally inflated; basidia 6.0-7.5 x 12.2-20.0 μ m, 4-sterigmate, without clamp connections; cystidia lacking. Hyphae of stipe surface above ring 3.0-13.8 μ m diam, parallel, tightly packed. Hyphae of ring 2.3-7.5 μ m diam. Cells of universal veil (stipe surface below ring) inflated, to 15.3 μ m diam, without clamp connections, thin-walled, hyaline.

Spores 4.5-5.5(7.0) x 3.0-4.5 μ m, ellipsoid to broadly

ellipsoid; wall dark brown, 0.6 μ m thick; apiculus indiscernible or a hyaline spot in the spore wall.

Schaeffer macrochemical reaction: negative.

Observations: *Agaricus subcomptulus* is a small species distinguished from *A. diminutivus* by its distinct umbo, delicate scales and slightly larger size, and from *A. subalachuanus* by its smaller spores and bulbous stipe.

The species is found in open woods (*teste* Murrill) and up to the present time has been found only in Florida. Edibility is unknown.

Specimens examined:

Florida: Gainesville, 2.vii.38, coll. & det. W. A. Murrill, no. 17335 (FLAS, TYPE); Gainesville, 8/11/44, det. W. A. Murrill, no. 21105 (TENN); Plauera Hammock, 16.viii.51, det. W. A. Murrill, no. F45883 (FLAS); Gainesville, 8/4/44, det. W. A. Murrill, no. F19293 (FLAS).

30. AGARICUS HANNONII FREEMAN, SP. NOV.

= *A. hannonii* Murrill *nom. herb.*

TYPE SPECIMEN (holotype): FLAS, Gainesville, Fla., 26.x.50, coll. C. J. Hannon, det. W. A. Murrill, no. 39000. (!)

Statura placomycetoidia; pileo convexo mox plano, 3 cm diam, fusco ut sicco, summo levi vel serico; stipito abrupte bulboso, 4 cm long; annulo superiore; cheilocystidiis absentes; cellulis integumentorum universorum -14.3 μ m diam; sporis 6.0-7.0 x 3.8-4.5 μ m.

Stature of carpophore placomycetoid; pileus convex to plane, to 3 cm diam, with gray and dusky disc (Murrill, notes), brown with slightly darker brown disc when dried; surface smooth to fibrillose; dried flesh to 2 mm thick at disc, thinning to < 1 mm at margin. Lamellae (mature) deep chocolate brown, free, to 3 mm deep. Stipe abruptly bulbous, to 4 cm long, appearing fibrous, concolorous with pileus when dried; ring superior, thick, mobile when dried, dull tan when dried.

Hyphae of pileus cuticle loosely interwoven, usually more or less repent; pileocystidia fasciculate or scattered, 3.0-6.0 μ m diam, unbranched; hyphae of pileus flesh 3.0-12.2 μ m diam, occasionally inflated, without clamp connections, thin-walled. Lamella trama irregular; hyphae 3.0-4.0 μ m diam, uninflated; basidia 6.0-7.5 x 18.5-21.5 μ m, 4-sterigmate, without clamp connections; cheilocystidia lacking. Hyphae of stipe surface above ring 3.0-12.2 μ m diam, parallel, tightly packed. Hyphae of ring 3.0-7.5 μ m diam. Cells of universal veil (stipe surface below ring) inflated,

to 14.3 μm diam, without clamp connections, thin-walled, hyaline.

Spores 6.0-7.0 x 3.8-4.5 μm , broadly ellipsoid to ovoid; lacking germ pore (SEM); wall dark brown, 0.6 μm thick; apiculus minutely papillate or indiscernible.

Schaeffer macrochemical reaction: negative.

Observations: To the best of my knowledge, Murrill never published a description of this taxon. The taxon is distinct and I retain Murrill's original name in acknowledgement of his recognition of the species. The type collection consists of approximately five broken, mature fruit bodies and very brief notes by Murrill.

The species is very close to *A. tantulus* but is distinguished by its slightly larger size and the tendency for the ring to disassociate from both the pileus margin and the stipe; there is also a clear difference in color when the specimens are fresh.

31. AGARICUS TANTULUS FREEMAN, SP. NOV.

TYPE SPECIMEN (holotype): MICH, Gainesville, Fla., --.32, coll. West & Murrill, no. F10163.

Statura placomycetoidia; pileo 2.5 cm diam, convexo mox plano, fusco, summo piloso; stipite bulboso, 4.5 cm longo; annulo superiore; cheilocystidiis absentes; cellulis integumentorum universorum -23.0 μm diam; sporis 4.5-6.0 (7.0) x 3.8-4.5 μm .

Stature of carpophore placomycetoid; mature pileus to 2.5 cm diam, convex to plane, cream-yellow when young, darkening with age (Murrill, notes), tannish-brown when dried; surface dark fibrillose; dried flesh to 2 mm thick at disc, thinning to < 1 mm at margin. Lamellae (mature) deep chocolate brown, free, to 2 mm deep. Stipe bulbous, to 4.5 cm long, appearing fibrous, concolorous with pileus when dry; ring superior, evanescent.

Hyphae of pileus cuticle loosely interwoven, usually repent; pileocystidia loosely fasciculate or scattered, 3.8-7.5 μm diam, usually unbranched; hyphae of pileus flesh 4.5-10.7 μm diam, occasionally inflated, without clamp connections, thin-walled. Lamella trama irregular; hyphae 3.0-7.5 μm diam, uninflated; basidia 6.0-15.3 μm , 4-sterigmate, without clamp connections; cystidia lacking. Hyphae of stipe surface above ring 3.0-13.8 μm diam, parallel, tightly packed. Hyphae of ring 3.0-6.0 μm diam. Cells of universal veil (stipe surface below ring) inflated, to 23.0 μm diam, without clamp connections, thin-walled, hyaline.

Spores 4.5-6.0(7.0) x 3.8-4.5 μm , broadly ellipsoid to ovoid; wall dark brown, 0.6 μm thick; apiculus minutely

papillate, hyaline or indiscernible.

Schaeffer macrochemical reaction: negative.

Observations: This small placomycetoid species is distinguished not only by its size, but also by the lack of distinct scales on the pileus surface and the color change to brown upon drying.

The type collection consists of approximately fifteen fruit bodies plus fragments. All specimens are mature.

Habitat preference and edibility are unknown.

Specimens examined:

Florida: 1932, det. as *Agaricus herradurensis*, s.n. (MICH); Gainesville, Alachua Co., 1943, det. A. H. Smith (as *A. herradurensis*), s.n. (MICH).

32. *AGARICUS SUBHORTENSIS* MURRILL, Lloydia 9: 328. 1946.

TYPE SPECIMEN (holotype, explicit): FLAS, Gainesville, Fla., 8.i.45, coll. & det. W. A. Murrill, no. 17971 (!)

Stature of carpophore placomycetoid; mature pileus convex to subexpanded, gibbous, to 5 cm diam (Murrill), pallid except for the disc, disc covered with reddish-brown innately fibrillose scales (Murrill), brown when dried; dried flesh to 3 mm thick at disc, thinning to < 1 mm at margin. Lamellae (mature) deep chocolate brown, free, to 4 mm deep. Stipe equal, to 4 cm long, appearing fibrous, white (Murrill), gold when dried; ring median, gold when dried.

Hyphae of pileus cuticle interwoven, usually repent; pileocystidia loosely fasciculate to scattered, 3.8-6.0 μ m diam, unbranched; hyphae of pileus flesh 4.5-23.0 μ m diam, occasionally inflated, without clamp connections, thin-walled. Lamella trama irregular; hyphae 3.0-8.5(15.3) μ m diam, occasionally inflated; basidia 6.0-9.2 x 20.0-29.0 μ m, 4-sterigmate, without clamp connections; cystidia lacking. Hyphae of stipe surface above ring 3.0-15.3 μ m diam, parallel, tightly packed. Hyphae of ring 3.0-13.8 μ m diam. Cells of universal veil (stipe surface below ring) inflated, to 18.5 μ m diam, without clamp connections, thin-walled, hyaline.

Spores 6.0-8.5 x 5.3-6.0 μ m, subglobose, subovoid, or broadly ellipsoid; wall dark brown, 0.6 μ m thick; apiculus merely a hyaline spot in the spore wall.

Schaeffer macrochemical reaction: negative.

Observations: This species is distinguished by its innately brown fibrillose pileus and large spores.

The species may be found in open woods (*teste* Murrill); its distribution is currently restricted to coastal plain areas. Edibility is unknown.

Specimens examined:

Alabama: Tuscaloosa, 1.xii.62, det. B. F. Isaacs, no. 25184 (TENN).

Florida: Gainesville, 8.i.45, coll. & det. W. A. Murrill, no. 17971 (FLAS, TYPE); Gainesville, 7.vii.50, det. W. A. Murrill (as *Agaricus cylindriceps*), no. F45907 (FLAS).

North Carolina: Chapel Hill, 6.xii.61, coll. J. N. Couch (as *A. campestris*), no. 15183 (NCU).

33. *AGARICUS RHOADSII* MURRILL, Bull. Torrey Bot. Club 66: 29. 1939.
= *A. weberianus* Murrill, Bull. Torrey Bot. Club 66: 29. 1939. (!)

TYPE SPECIMEN (holotype, explicit): FLAS, Gainesville, Fla., 7.ix.38, coll. Rhoads & Murrill, det. W. A. Murrill, no. 18117. (!)

Stature of carpophore placomycetoid; mature pileus truncate-conic to expanded, to 6.5 cm diam (Murrill), pale dilute-vinaceous, castaneous on the disc, margin white (Murrill), dull gold with brown fibrils when dried; surface finely fibrillose-squamulose; dried flesh to 2 mm thick at disc, thinning to < 1 mm at margin. Lamellae whitish to dull pink (Murrill), deep chocolate brown when mature, free, to 1.5 mm deep. Stipe bulbous, to 8 cm long, appearing fibrous, white (Murrill), concolorous with pileus when dried; ring appendiculate, superior when adhering to stipe, dull gold when dried.

Hyphae of pileus cuticle interwoven, usually repent; pileocystidia loosely fasciculate or scattered, 3.0-7.4 μ m diam, usually unbranched; hyphae of pileus flesh 6.0-13.8 μ m diam, inflated, without clamp connections, thin-walled. Lamella trama irregular; hyphae 2.3-13.8 μ m diam, uninflated or only slightly so; basidia 4.5-7.0 x 10.7-15.3 μ m, 4-sterigmate, without clamp connections; cystidia lacking. Hyphae of stipe surface above ring 3.0-15.3 μ m diam, parallel, tightly packed. Hyphae of ring 3.0-11.5 μ m diam. Cells of universal veil (stipe surface below ring) inflated, to 27.5 μ m diam, without clamp connections, thin-walled, hyaline.

Spores 5.3-6.0 x 3.8-4.5 μ m, ellipsoid to broadly ellipsoid or ovoid, lacking germ pore (SEM); wall dark brown, 0.6 μ m thick; apiculus indiscernible.

Schaeffer macrochemical reaction: negative.

Observations: When fresh, this species is outstanding for its pale-purple color. When dried, the subcampanulate pileus, dense innate fibrillose texture of the cap and the abruptly bulbous stipe base distinguish the species. Outwardly, it could be confused with a delicate form of *A. subrufescens*, but the spores of the latter are much larger than those of *A. rhoadsii*.

The species is found in open woods and up to the present time is known only from Florida. Edibility is unknown.

Specimens examined:

Florida: Gainesville, 7.ix.38, coll. Rhoads & Murrill, no. 18117 (FLAS, TYPE); Gainesville, 28.vii.45, det. W. A. Murrill, no. 19680 (TENN); Gainesville, -.40, det. W. A. Murrill, s.n. (MICH); Gainesville, 15.vii.44, det. W. A. Murrill, s.n. (NYS); Gainesville, 15.vii.44, det. W. A. Murrill, s.n. (NCU); Gainesville, 4.viii.44, det. W. A. Murrill, s.n. (BPI).

34. AGARICUS AURESICCESCENS FREEMAN, SP. NOV.

TYPE SPECIMEN (holotype): NCU, Chapel Hill, N.C., 19.ix.44, coll. W. C. Coker, det. A. H. Freeman, no. 13598.

Statura placomycetoidia; pileo 15 cm diam, convexo mox plano, prope albo, aureo ut sicco; summo prope squameo; stipito abrupte bulboso, 10 cm long, portanto rades; annulo superiore; cheilocystidiis absentes; cellulis integumentorum universorum -20.0 μ m diam; sporis 5.5-6.0 x 3.8-4.5 μ m.

Stature of carpophore placomycetoid; mature pileus convex to plane, disc often depressed when dried, to 15 cm diam, nearly white, pale pinkish buff on center (Coker, notes), gold when dried; surface appressed fibrillose squamulose; dried flesh to 3 mm thick at disc, thinning to 1 mm at margin; margin slightly inrolled. Lamellae (mature) deep chocolate brown, free, to 2 mm deep. Stipe abruptly bulbous, to 10 cm long, appearing fibrous, brown when dried, lower portion covered with ground mycelium, base often with one to three rhizomorphic strands; ring superior, bearing floccose patches on lower surface, gold when dried.

Hyphae of pileus cuticle loosely interwoven, usually repent; pileocystidia loosely fasciculate or scattered, 3.0-6.0 μ m diam, unbranched; hyphae of pileus flesh 4.5-15.3 μ m diam, occasionally inflated, thin-walled, without clamp connections. Lamella trama irregular; hyphae 2.3-

18.5 μm diam, occasionally inflated; basidia 6.0–7.5 x 15.3–21.5 μm , 4-sterigmate, without clamp connections; cystidia lacking. Hyphae of stipe surface above ring 2.3–18.5 μm diam, parallel, tightly packed. Hyphae of ring 3.0–12.2 μm diam. Cells of universal veil (stipe surface below ring) inflated, to 20.0 μm diam, without clamp connections, thin-walled, hyaline.

Spores 5.5–6.0 x 3.8–4.5 μm , broadly ellipsoid to ovoid; wall dark brown, 0.6 μm thick; apiculus indiscernible.

Schaeffer macrochemical reaction: negative.

Observations: *Agaricus aurescens* closely resembles *A. abruptibulbus*, but is distinguished by the appressed fibrils on the surface of the pileus, the rhizomorphic strands on the stipe base, the distinctly cellular universal veil tissue and smaller spores. When dried, the specimens turn a deep rich gold.

Habitat preference and edibility are unknown.

Specimens examined:

North Carolina: Chapel Hill, 19.ix.44, coll. W. C. Coker, no. 13598 (NCU, TYPE); Chapel Hill, 21.ix.44, coll. W. C. Coker (as *Psalliota arvensis*), no. 13600 (NCU).

35. *AGARICUS SUBRUFESCENS* PECK, N.Y. State Mus. Bull. 43: 236. 1894.

TYPE SPECIMEN (holotype, implicit). NYS, Glen Cove, L.I., N.Y., -x-, coll. W. Falconer, det. C. H. Peck, s.n. (!)

Stature of carpophore placomycetoid; pileus deeply convex or broadly expanded, to 15 cm diam (Peck), whitish, grayish or dull reddish-brown (Peck), dull gold to gray-gold when dried; surface brown silky fibrillose to squamulose; dried flesh to 5 mm thick at disc, thinning to < 1 mm at margin. Lamellae white in youth, deep chocolate brown when mature, free, to 5 mm deep. Stipe bulbous, to 10 cm long, appearing fibrous, concolorous with pileus, stuffed, then hollow (Peck); ring superior, membranous, dull gold when dried.

Hyphae of pileus cuticle interwoven, usually repent; pileocystidia fasciculate, to 7.5 μm diam, usually unbranched; hyphae of pileus flesh 3.0–18.5 μm diam, occasionally inflated, without clamp connections, thin-walled. Lamella trama irregular; hyphae 2.3–15.3 μm diam, occasionally inflated; basidia 4.5–9.2 x 13.8–21.5 μm , 4-sterigmate, without clamp connections; cystidia lacking. Hyphae of stipe surface above ring 3.0–12.2 μm diam, paral-

1el, tightly packed. Hyphae of ring 3.0-15.3 μ m diam. Cells of universal veil (stipe surface below ring) inflated, to 16.8 μ m diam, without clamp connections, thin-walled, hyaline.

Spores 4.5-7.4(9.2) x 3.8-5.3 μ m, subglobose to ovoid or ellipsoid; wall dark brown, 0.6 μ m thick; apiculus minutely papillate to indiscernible, hyaline.

Schaeffer macrochemical reaction: negative.

Observations: As Kauffman (1918) noted, this is a highly variable species which grows not only in a wild state, but also tends to appear in greenhouses. It is therefore sometimes found exhibiting a squat campestroid stature or a large, thick-set placomycetoid stature. It is comparable to *A. placomyces*, but with much thicker flesh, larger numbers of innately fibrillose squamules and larger spores. Peck compared the species to *A. campestris*, but said it differed in its deeply convex shape when young and the white of the immature lamellae; these differences supported by microscopic data indicate that the two species are distinct.

The species is found in mixed woods or in humus in greenhouses. Its current range extends from New York south to North Carolina.

Specimens examined:

Maryland: Beltsville, 22.ix.38, det. V. K. Charles (as *Agaricus placomyces*), s.n. (BPI); Beltsville, 17.v.38, det. V. K. Charles (as *A. placomyces*), s.n. (BPI).

New York: Glen Cove, L.I., -.x.-, coll. W. Falconer, det. C. H. Peck, s.n. (NYS, TYPE).

North Carolina: Chapel Hill, 6.ix.15, coll. W. C. Coker (as *Psalliota silvatica*), no. 1686 (NCU); Chapel Hill, 6.ix.15, coll. W. C. Coker (as *P. silvatica*), no. 1685 (NCU); Chapel Hill, 26.x.19, coll. W. C. Coker (as *A. silvaticus*), no. 3510 (NCU); Chapel Hill, 25.ix.14, coll. H. R. Totten (as *P. silvatica*), no. 1265 (NCU).

Virginia: Arlington Farm, -.vi.40, coll. E. B. Lambert, s.n. (BPI); Arlington Farm, -.v.40, coll. E. B. Lambert, s.n. (BPI); Chain Bridge, 6.viii.12, det. Peck, s.n. (BPI).

36. AGARICUS POCILLATOR MURRILL, Mycologia 33: 446. 1941.

TYPE SPECIMEN (holotype, explicit): FLAS, Gainesville, Fla., 4.vi.38, coll. & det. W. A. Murrill, no. 16476.

(!) Isotypes: NY, no. 16476 (!); NCU s.n. (!); BPI, s.n. (!)

Stature of carpophore placomycetoid (Fig. 2B); mature pileus truncate-convex to plane, to 10 cm diam (Murrill), white with dark floccose scales, fuscous on the disc (Murrill), dull gray-tan, somewhat darker on the disc when dried; dried flesh to 3 mm thick at disc, thinning to < 1 mm at margin. Lamellae (mature) deep chocolate brown, free, to 3 mm deep. Stipe bulbous to cupulate at base, to 8 cm long, appearing fibrous, dull brown when dried; ring superior, conspicuously double, the lower portion rounding up into a discrete partial veil, the upper portion (marginal veil) stretching entirely across the lamellae in youth, thin, membranous, brown when dried.

Hyphae of pileus cuticle interwoven, usually repent; pileocystidia loosely fasciculate or scattered, 2.3-6.0 μ m diam, unbranched; hyphae of pileus flesh 3.0-20.0 μ m diam, occasionally inflated, without clamp connections, thin-walled. Lamella trama irregular; hyphae 2.3-10.0 μ m diam, occasionally inflated; basidia 4.5-7.0 x 10.7-18.5 μ m, 4-sterigmate, without clamp connections; cystidia lacking. Hyphae of stipe surface above ring 3.0-13.8 μ m diam, parallel, tightly packed. Hyphae of ring 2.3-13.8 μ m diam. Cells of universal veil (stipe surface below ring) inflated, to 21.5 μ m diam, without clamp connections, thin-walled, hyaline.

Spores 4.5-6.0 x 3.0-3.8 μ m, ellipsoid to broadly ellipsoid; wall dark brown, less than 0.6 μ m thick; apiculus papillate, hyaline.

Schaeffer macrochemical reaction: negative.

Observations: This is a most distinctive species due to the double nature of the ring. Smith ("1939", 1940) considered it merely a variety of *A. placomyces*, but the obviously double ring, cupulate stipe base, and tiny floccose, gray scales distinguish it.

The species is found in open woods; it appears to be restricted to coastal plain and low elevations of mountainous areas. Edibility is unknown.

Specimens examined:

Alabama: Auburn, l.viii.55, det. B. F. Isaacs, no. 21948 (TENN).

Florida: Gainesville, 4.vi.38, coll. & det. W. A. Murrill (FLAS, no. 16476, TYPE; NY, no. 16476, Isotype; NCU, s.n., Isotype; BPI, s.n., Isotype); Gainesville, 22.vii.44, det. W. A. Murrill, s.n. (BPI); Gainesville, -.44, det. W. A. Murrill, s.n. (NCU); Gainesville, 22.vii.44, det. W. A. Murrill, s.n. (NYS); Gainesville, 9.vii.51, det. G.F. Weber, no. F45891 (FLAS); New Smyrna, 1920, det. H. C. Beardslee Jr. (as *Psalliota placomyces*), s.n. (MICH); Gainesville, -.vii.43, det. R. Singer, s.n. (MICH); Gainesville, -.38, det. W. A. Murrill, no. 16051 (TENN).

North Carolina: Chapel Hill, 25.ix.45, det. W. C. Coker, no. 13945 (NCU); Chapel Hill, 8.x.48, coll. W. C. Coker (as *Psalliota* sp.), no. 14477 (NCU); Chapel Hill, 27.ix.45, coll. J. N. Couch (as *P. sp.*), no. 13993 (NCU); Chapel Hill, 28.ix.47, coll. W. C. Coker (as *P. sp.*), no. 14227 (NCU); Chapel Hill, 25.vii.45, coll. J. N. Couch, no. 14015 (NCU); Chapel Hill, 10.viii.48, coll. J. N. Couch (as *P. sp.*), no. 14479 (NCU); Chapel Hill, 19.ix.47, coll. W. C. Coker (as *P. sp.*), no. 14198 (NCU); Chapel Hill, 9.vii.46, coll. J. N. Couch (as *P. sp.*), no. 13714 (NCU); U.N.C. arboretum, 25.ix.44, coll. McCann, no. 13602 (NCU); 11.viii.44, coll. J. N. Couch (as *P. sp.*), no. 13593 (NCU); 29.ix.44, coll. Coker, no. 13608 (NCU); 21.vii.44, coll. Coker & Couch, no. 13587 (NCU); Highlands, 23.vii.53, det. B. F. Isaacs, no. 20924 (TENN).

Tennessee: Sevier Co., 18.x.36, det. B. F. Isaacs, no. 9589 (TENN); Cades Cove, 3.ix.52, det. L. R. Hesler, no. 20555 (TENN); Norris, 9.x.54, det. B. F. Isaacs, no. 21564 (TENN); Knoxville, 18.viii.66, det. A. H. Freeman, no. 29223 (TENN).

37. *AGARICUS PLACOMYCES* PECK, VAR. *PLACOMYCES*, N. Y. State Mus. Bull. 29: 40. 1878.

TYPE SPECIMEN (holotype, implicit): NYS, Knowersville and Oneida, N.Y., no date, coll. & det. C. H. Peck, s.n. (!) Isotype: NCU, s.n. (!)

Stature of carpophore placomycetoid (Fig. 3A); pileus convex, then expanded to plane, to 8 cm diam (Peck); surface covered with appressed, fibrillose scales, whitish, the disc and scales brown (Peck), dull gray-gold with brown scales when dried; dried flesh to 2 mm thick at disc, thinning at margin: Lamellae (mature) deep chocolate brown, free, to 5 mm deep. Stipe bulbous, usually with one or two root-like processes, to 13 cm long, appearing fibrous, white, somewhat stuffed (Peck), dull tan to gray when dried; ring superior, often studded with drops of a dark brown liquid (Peck), gray-tan to brown when dried.

Hyphae of pileus cuticle tightly interwoven, repent; pileocystidia fasciculate or scattered, branched or unbranched, 3.0-9.2 μ m diam, golden brown; hyphae of pileus flesh 3.0-20.0 μ m diam, occasionally inflated, without clamp connections, thin-walled. Lamella trama irregular; hyphae 3.0-18.5 μ m diam, irregularly inflated; basidia 6.0-7.0 x 12.2-23.0 μ m, 4-sterigmate, without clamp connections; cystidia lacking. Hyphae of stipe surface above ring 3.0-23.0 μ m diam, parallel, tightly packed. Hyphae of ring 1.5-12.2 μ m diam. Cells of universal veil (stipe surface below ring) inflated, to 26.0 μ m diam, without clamp connections, thin-walled, hyaline.

Spores (4.5)5.3-6.0(7.0) x (3.0)3.8-4.5 μ m, ellipsoid



Figure 3. Two common woodland species: (A) *Agaricus placomyces* var. *placomyces*; and (B) *Agaricus abruptibulbus*.

to ovoid; wall dark brown, less than 0.6 μ m thick; apiculus papillate, hyaline.

Schaeffer macrochemical reaction: negative.

Observations: *Agaricus placomyces* is one of the most common woodland species of *Agaricus* in the Smoky Mountain area of Tennessee. It is distinguished by the large reddish-brown scales on the pileus and the bulbous stipe base which almost always bears one to several rhizomorphic strands. Although the specimens are occasionally found in deciduous woods, fruit bodies seem to be mainly associated with species of *Abies*.

Edibility is questionable.

Specimens examined:

Alabama: Montgomery, 16.viii.42, det. A. H. Smith (as *Agaricus silvaticus*), s.n. (MICH); Robinson's Springs, 29.vi.42, det. A. H. Smith (as *A. silvaticus*), s.n. (MICH); Robinson's Springs, 29.vi.42, det. A. H. Smith (as *A. silvaticus*), s.n. (MICH).

Kentucky: Jones Creek Rd., Trigg Co., 16.ix.74, det. W. J. Sundberg, no. 2857 (WJS).

Maryland: Herald Harbor, Anne Arundel Co., 27.viii.33, det. V. K. Charles, s.n. (BPI); Great Falls, 7.x.29, coll. C. S. Parker (as *Psalliota silvatica*), no. 1318-56-A (BPI); Chapel Pt., 20.x.36, det. V. K. C. (as *P. silvatica*), s.n. (BPI); Herald Harbor, 9/8/25, det. J. A. Stevenson (as *A. silvicola*), s.n. (BPI); Cabin John Run, Montgomery Co., 28.ix.52, det. J. A. Stevenson (as *A. silvatica*), s.n. (BPI); Sutland, 27.iii.33, det. C. S. & A. L. Parker (as *P. sp.*), s.n. (BPI); Bell Sta., 20.ix.35, det. J. A. Stevenson & E. B. Lambert (as *A. silvicola*), s.n. (BPI); Bay Ridge, Anne Arundel Co., 30.viii.33, det. C. S. & A. L. Parker (as *P. sp.*), s.n. (BPI); Wildlife Refuge, 13.ix.67, det. O. K. Miller, no. OKM6102 (VPI).

New York: Knowersville and Oneida, no date, coll. & det. C. H. Peck (NYS, s.n., TYPE; NCU, s.n., ISOTYPE).

North Carolina: Tuxedo, Henderson Co., 15.ix.74, det. A. H. Smith (as *A. subrutilescens*), KHM 14302 (BPI); Chapel Hill, 18.x.46, coll. W. C. Coker (as *P. sp.*), no. 14057 (NCU); Chapel Hill, 29.ix.46, det. A. H. Freeman, no. 14036 (NCU); Battles Park, 2.x.09, no. 221 (NCU); no. 223 (NCU); 5.x.12, coll. W. C. Coker, no. 507 (NCU); 12.ix.13, coll. W. C. Coker, no. 738 (NCU); Chapel Hill, 23.x.11, coll. W. B. Cobb, no. 1016 (NCU); Chapel Hill, 18.x.46, coll. W. C. Coker (as *P. sp.*), no. 14056 (NCU); Chapel Hill, 24.ix.14, coll. H. R. Totten, no. 1256 (NCU); Chapel Hill, 28.ix.14, coll. H. R. Totten, no. 1266 (NCU); Highlands, 2.viii.31, coll. A. H. S., A. J. S. & Clark Foreman, no. 9033 (NCU); Chapel Hill, 12.x.47, coll. W. C. Coker (as *P. sp.*), no.

14266 (NCU); Indian Creek Rd., 8.viii.75, det. A. H. Freeman, no. 40078 (TENN); Indian Creek Rd., 8.viii.75, det. A. H. Freeman, no. 40074 (TENN); Indian Creek Rd., 8.viii.75, det. A. H. Freeman, no. 40073 (TENN); Henderson Co., 12.viii.63, det. B. F. Isaacs (as *A. bambusigenus*), no. 26578 (TENN); Bryson City, 23.viii.36, det. B. F. Isaacs (as *A. bambusigenus*), no. 9286 (TENN); Cataloochee, 28.vii.35, det. B. F. Isaacs (as *A. bambusigenus*), no. 8052 (TENN).

Tennessee: Knoxville, 17.vii.34, det. L. R. Hesler, no. 4485 (TENN); Kingston, 5.viii.34, det. L. R. Hesler, no. 5339 (TENN); New Hopewell, 21.x.34, det. B. F. Isaacs (as *A. bambusigenus*), no. 7107 (TENN); Cosby, 30.vii.36, det. B. F. Isaacs (as *A. bambusigenus*), no. 9016 (TENN); Sevier Co., Greenbriar, 18.x.36, det. B. F. Isaacs (as *A. bambusigenus*), no. 9621 (TENN); GSMNP, 16.vi.40, det. L. R. Hesler, no. 12538 (TENN); Mt. LeConte, 20.vii.41, det. B. F. Isaacs (as *A. bambusigenus*), no. 13852 (TENN); Sevier Co., 12.viii.42, det. A. H. Smith, no. 14479 (TENN); Cades Cove, 27.ix.47, det. B. F. Isaacs (as *A. bambusigenus*), no. 17898 (TENN); Mt. LeConte, 8.viii.54, det. B. F. Isaacs (as *A. bambusigenus*), no. 21474 (TENN); Sevier Co., 15.x.55, det. B. F. Isaacs (as *A. bambusigenus*), no. 22157 (TENN); Mt. LeConte, 6.viii.63, det. B. F. Isaacs (as *A. bambusigenus*), no. 27526 (TENN); Smokemont, 11.ix.65, det. B. F. Isaacs (as *A. bambusigenus*), no. 28373 (TENN); Cades Cove, 2.viii.66, det. L. R. Hesler, no. 29325 (TENN); Univ. Tenn. woodlot, 5.x.75, det. A. H. Freeman, no. 40071 (TENN); Univ. Tenn. woodlot, 29.ix.74, det. A. H. Freeman, no. 40072 (TENN); Univ. Tenn. woodlot, 5.x.75, det. A. H. Freeman, no. 40074 (TENN); Univ. Tenn. woodlot, 29.ix.74, det. A. H. Freeman, no. 40076 (TENN); Cades Cove, 31.vii.75, det. A. H. Freeman, no. 40077 (TENN); Cades Cove, 31.vii.75, det. A. H. Freeman, no. 40079 (TENN); Cades Cove, 18.viii.38, det. A. H. Smith (as *A. subrutilescens*), s.n. (MICH); Elkmont, 7.ix.37, det. A. H. Smith (as *A. subrutilescens*), s.n. (MICH); New Hopewell, Knox Co., 13.vii.39, det. L. R. Hesler (as *P.*), s.n. (MICH); Laurel Falls, 22.viii.38, det. A. H. Smith (as *A. subrutilescens*), s.n. (MICH).

Virginia: Buckingham Co., 13.ix.61, coll. Dublin (as *A. silvatica*), s.n. (BPI); Lynchburg, 4.ix.26, det. W. A. Murrill, no. F10151 (FLAS); Occoquam, 10.x.33, det. V. K. Charles (as *A. micromegetha*), s.n. (BPI).

Washington, D.C.: 22.ix.13, det. Mr. & Mrs. J. N. Rose, s.n. (BPI).

38. AGARICUS ABRUPTIBULBUS PECK, N. Y. State Mus. Bull. 94: 36. "1904" (1905).

≡ *A. arvensis* var. *abruptus* Peck, N.Y. State Mus. Bull. 48: 239. 1894.

≡ *A. abruptus* Peck, N.Y. State Mus. Mem. 4, 3: 163, 1900. (non *A. abruptus* Fries, Hym. Eur., 245. 1874.)

= *A. cretacellus* Atkinson, J. Myc. 8: 110. 1902.

TYPE SPECIMEN (lectotype, *des. mihi*): NYS, West Albany, N.Y., -.-.92, coll. & det. C. H. Peck, s.n. (!)

Stature of carpophore placomycetoid (Fig. 3B); pileus ovate, convex or plane, to 10 cm diam, white tinged with yellow (Peck), pale gold-tan when dried; surface smooth; dried flesh to 4 mm thick at disc, thinning to < 1 mm at margin. Lamellae (mature) deep chocolate brown, free, to 2 mm deep. Stipe to 13 cm long, bulbous, often rimmed and depressed at base, appearing fibrous, concolorous with pileus, stuffed or hollow; ring superior, bearing floccose patches below, more or less appendiculate, pale gold when dried.

Hyphae of pileus cuticle tightly interwoven, repent; pileocystidia lacking; hyphae of pileus flesh 4.5-15.3 μ m diam, occasionally inflated, thin-walled, without clamp connections. Lamella trama irregular; hyphae 3.0-10.7(23.0) μ m diam, usually uninflated; basidia 4.5-7.0 x 13.8-20.0 μ m, 4-sterigmate, without clamp connections; cystidia lacking. Hyphae of stipe surface above ring 3.0-23.0 μ m diam, parallel, tightly packed. Hyphae of ring 3.0-13.8 μ m diam. Cells of universal veil (stipe surface below ring, patches on lower surface of ring) inflated, to 32.0 μ m diam, occasionally almost hypha-like, without clamp connections, thin-walled, hyaline.

Spores (5.5)6.0-7.5 x (3.8)4.5-5.5 μ m, ellipsoid to ovoid; wall dark brown, 0.6 μ m thick; apiculus a hyaline spot in the spore wall or indiscernible.

Schaeffer macrochemical reaction: negative.

Observations: This species is easily recognized both macroscopically and microscopically; its woodland habitat, placomycetoid stature and glabrous pileus combined with its white coloration make it a unique species for the southeastern taxa. In youth it could be mistaken for a member of the *Amanita virosa* group, but its lack of a discrete volva and pink tint to the young lamellae distinguish it. Microscopically, the taxon is unique in the nature of the universal veil tissue, which consists of highly inflated, very long, irregularly shaped cells.

The species is known from New York south to Florida; according to Peck, it is edible.

Specimens examined:

Alabama: Robinson's Springs, -.viii.42, det. A. H. Smith (as *Agaricus cretacellus*), s.n. (MICH).

Florida: Devil's Millhopper, 9/11/68, det. J. Kimbrough (as *A. alachuanus*), no. F48028 (FLAS); Tung-oil

Mill, 7/12/38, det. W. A. Murrill (as *A. sylvicola*), no. F17785 (FLAS).

Maryland: Cabin John Woods, 23.ix.37, det. V. K. Charles, s.n. (BPI); Bay Ridge, Anne Arundel Co., 30.viii.33, coll. C. S. & A. L. Parker (as *Psalliota*), no. 4360 (BPI); Woodards Woods, 28.ix.40, coll. C. S. Parker (as *P.*), no. 10078 (BPI); 20.viii.33, coll. C. S. & A. L. Parker (as *P.*), no. 4303 (BPI); Harper's Ferry, 27.vii.19, det. C. H. Kauffman, s.n. (BPI); Ardmore, 26.viii.33, coll. C. S. & A. L. Parker (as *P. abruptibulba*), no. 4365 (BPI).

New York: West Albany, --.92, coll. & det. C. H. Peck, s.n. (NYS, TYPE).

North Carolina: Indian Creek Rd., 8.viii.75, det. A. H. Freeman, no. 40082 (TENN); Indian Creek Rd., 8.viii.75, det. A. H. Freeman, no. 40083 (TENN); Asheville, 1900, det. H. C. Beardslee, s.n. (MICH); Hot Springs, 21.viii.24, det. C. H. Kauffman (as *P. cretacella*), s.n. (MICH); Highlands, 16.viii.36, det. L. R. Hesler (as *P. abruptibulba*), s.n. (MICH); Highlands, 11.viii.34, coll. W. C. Coker (as *P. sylvatica*), no. 9778 (NCU); Chapel Hill, 8.ix.15, coll. H. R. Totten (as *A. abruptus*), no. 1699 (NCU); Chapel Hill, 23.ix.47, coll. Coker (as *P. abruptibulba*), no. 14206 (NCU); 15.x.10-22.x.10, (as *A. abruptus*), no. 220 (NCU); Indian Springs, 24.ix.10, (as *A. abruptus*), no. 219 (NCU); 8.ix.15, coll. H. R. Totten (as *A. abruptus*), no. 1700 (NCU); Chapel Hill, 24.ix.14, coll. H. R. Totten (as *A. abruptus*), no. 1262 (NCU); Chapel Hill, 10.vii.14, coll. W. C. Coker (as *A. abruptus*), no. 1111 (NCU); 13.ix.13, coll. Totten (as *A. abruptus*), no. 754 (NCU); 20.vi.13, coll. W. C. Coker (as *A. abruptus*), no. 706 (NCU); Chapel Hill, 29.ix.46, coll. W. C. Coker (as *A.*), no. 14031 (NCU); Chapel Hill, 23.ix.14, coll. H. R. Totten, no. 1247 (NCU); 22.vi.16, coll. H. R. Totten (as *P. abruptibulba*), no. 2264 (NCU); Chapel Hill, 25.x.15, coll. H. R. Totten (as *P. abruptibulba*), no. 1923 (NCU); Chapel Hill, 8.viii.46, coll. W. C. Coker (as *P. abruptibulba*), no. 13727 (NCU); Chapel Hill, 10-14.viii.--, coll. W. C. Coker (as *P. abruptibulba*), no. 1120 (NCU); Chapel Hill, 28.ix.47, coll. W. C. Coker (as *P. abruptibulba*), no. 14241 (NCU).

Tennessee: Mt. LeConte, 8/10/34, det. L. R. Hesler (as *A. cretacellus*), no. 5338 (TENN); Blount Co., 8/23/34, det. L. R. Hesler, no. 6305 (TENN); Crossville, 7.vii.35, det. B. F. Isaacs (as *A. cretacellus*), no. 7932 (TENN); Crossville, 7.vii.35, det. B. F. Isaacs (as *A. cretacellus*), no. 7940 (TENN); New Hopewell, 21.viii.35, det. B. F. Isaacs (as *A. fabaceus*), no. 8278 (TENN); Mt. LeConte, 16.viii.63, det. B. F. Isaacs (as *A. cretacellus*), no. 10195 (TENN); Mt. LeConte, 6.viii.39, det. B. F. Isaacs (as *A. cretacellus*), no. 12207 (TENN); Mt. LeConte, 25.viii.40, det. B. F. Isaacs (as *A. cretacellus*), no. 12836 (TENN); Mt. LeConte, 30.viii.40, det. A. H. Smith (as *A. cretacellus*), no. 12854 (TENN); Cades Cove, 1.ix.40, det. B. F. Isaacs (as *A. cretacellus*), no. 12896 (TENN); Mt. LeConte, 20.vii.41, det. B. F. Isaacs

(as *A. fabaceus*), no. 13846 (TENN); Cades Cove, 3.viii.64, det. A. H. Freeman, no. 23013 (TENN); GSMNP, 11.x.59, det. B. F. Isaacs (as *A. fabaceus*), no. 23438 (TENN); Norris, 22.viii.61, det. B. F. Isaacs (as *A. cretacellus*), no. 24499 (TENN); Norris, 8.vii.63, det. B. F. Isaacs (as *A. fabaceus*), no. 25668 (TENN); Cades Cove, 2.viii.66, det. A. H. Freeman, no. 29328 (TENN); Pickett State Park, -.ix.74, det. A. H. Freeman, no. 40080 (TENN); GSMNP, 5.viii.75, det. A. H. Freeman, 40081 (TENN); GSMNP, 13.viii.75, det. A. H. Freeman, no. 40084 (TENN); Cades Cove, 23.vii.75, det. A. H. Freeman, no. 40085 (TENN); Oak Ridge, -.x.74, det. A. H. Freeman, no. 40086 (TENN); Cades Cove, 16.viii.38, det. A. H. Smith (as *A. cretacellus*), s.n. (MICH); Cades Cove, 18.viii.38, det. A. H. Smith (as *A. cretacellus*), s.n. (MICH); Mt. LeConte, 23.viii.41, det. L. R. Hesler (as *P. abruptibulba*), s.n. (MICH); New Hopewell, 21.viii.35, det. A. H. Smith (as *P. abruptibulba*), s.n. (MICH); Cades Cove, 18.viii.38, det. A. H. Smith (as *A. silvicola*), s.n. (MICH); Cades Cove, 25.viii.38, det. A. H. Smith (as *A. silvicola*), s.n. (MICH).

Virginia: Lynchburg, 13.viii.27, det. W. A. Murrill (as *A. silvicola*), no. F10145 (FLAS); Blacksburg, 22.viii.70, coll. O. K. & Hope Miller, det. A. H. Freeman, no. OKM8648.

Washington, D.C.: 9.ix.36, det. C. S. & A. L. Parker (as *A. rodmani*), s.n. (BPI); 9.ix.33, coll. C. S. & A. L. Parker, no. 4395 (BPI); Rock Creek Park, 9/6/37, det. L. C. C. Krieger, s.n. (BPI); Rock Creek Park, 26.ix.37, det. V. K. Charles, s.n. (BPI); Rock Creek Park, 30.ix.45, det. J. A. Stevenson, s.n. (BPI).

39. AGARICUS BLOCKII MURRILL, Mycologia 46: 112. 1954.

TYPE SPECIMEN (holotype, explicit): FLAS, Gainesville, Fla., 6.vii.50, coll. Dr. S. S. Block, det. W. A. Murrill, no. 21533. (!)

Stature of carpophore placomycetoid; mature pileus conic to truncate-convex, to 7 cm diam (Murrill), white with fibrillose scales, isabelline on disc (Murrill), dull gold when dried; dried flesh to 4 mm thick at disc, thinning to < 1 mm at margin; margin undulate. Lamellae (mature) deep chocolate brown, free, to 4 mm deep. Stipe tapering upward, to 5 cm long, appearing fibrous, white with tawny fibrillose scales pointing upward below the ring (Murrill), concolorous with pileus when dried; ring median, more or less appendiculate, gold when dried.

Hyphae of pileus cuticle interwoven, usually repent; pileocystidia fasciculate or scattered, to 7.5 μ m diam, unbranched; hyphae of pileus flesh 4.5-13.8 μ m diam, occasionally inflated; without clamp connections, thin-walled. Lamella trama irregular; hyphae 3.0-6.0 μ m diam, uninflated; basidia 6.0 x 12.2-15.3 μ m, 4-sterigmate, without

clamp connections; cystidia lacking. Hyphae of stipe surface above ring 3.0-12.2 μm diam, parallel, tightly packed. Hyphae of ring 4.5-10.7 μm diam. Cells of universal veil (stipe surface below ring) inflated, to 21.5 μm diam, without clamp connections, thin-walled, hyaline.

Spores 4.5-6.0 x 3.8-4.5 μm , broadly ellipsoid to ovoid, often maturing to subglobose; lacking germ pore (SEM); wall dark brown, 0.6 μm thick; apiculus minute, hyaline.

Schaeffer macrochemical reaction: negative.

Observations: Of collections other than the type, only one was in adequate condition for positive identification. The species seems to be most characterized by its placomycetoid stature and sharply upward-tapering stipe.

The species may be found in open grassy areas (*teste* Murrill) and up to the present time is known only from Florida.

Specimens examined:

Florida: Gainesville, 6.vii.50, coll. Dr. S. S. Block, det. W. A. Murrill, no. 21533 (FLAS, TYPE); Gainesville, 25.vii.69, det. N. Black (as *Agaricusalachuanus*), no. 48664 (FLAS).

40. AGARICUS CITRINIDISCUS MURRILL, Quart. J. Florida Acad. Sci. 8: 193. 1945.

TYPE SPECIMEN (holotype, explicit): FLAS, Gainesville, Fla., 11.viii.44, coll. & det. W. A. Murrill, no. 32719. (!)

Stature of carpophore placomycetoid; mature pileus convex or slightly depressed, to 5 cm diam (Murrill), citrinous over disc, fading toward margin (Murrill), dull tan when dried, slightly darker over the disc; surface slightly squamulose; dried flesh to 2 mm thick at disc, thinning to < 1 mm at margin. Lamellae (mature) deep chocolate brown, free, to 2 mm deep. Stipe bulbous, to 3 cm long, appearing fibrous, white (Murrill), dull gold when dried; ring superior when adhering to stipe, appendiculate, gold when dried.

Hyphae of pileus cuticle loosely interwoven, usually repent; pileocystidia loosely fasciculate, 3.0-10.7 μm diam, branched or unbranched; hyphae of pileus flesh 3.0-15.3 μm diam, occasionally inflated, without clamp connections, thin-walled. Lamella trama irregular; hyphae 3.0-15.3 μm diam, some inflated; basidia 4.5-6.0 x 13.8-18.5 μm , 4-sterigmate, without clamp connections; cystidia lacking. Hyphae of stipe surface above ring 4.5-18.5 μm diam,

parallel, tightly packed. Hyphae of ring 3.0-7.5 μm diam. Cells of universal veil (stipe surface below ring) inflated, to 23.9 μm diam, without clamp connections, thin-walled, hyaline.

Spores 4.5-6.0 x 3.8-4.5 μm , subglobose to broadly ellipsoid or ovoid; lacking germ pore (SEM); wall dark brown, 0.6 μm thick; apiculus indiscernible.

Schaeffer macrochemical reaction: negative.

Observations: This is a small placomycetoid species, characterized by its citrinous pileus when fresh. When dried, its small size, thin flesh and slightly squamulose surface distinguish it from small forms of *A. placomyces*.

Murrill referred to this species as rare and delicate. It may be found in open woods. Edibility is unknown.

Specimens examined:

Alabama: Fusihatchie, 5.vii.42, det. A. H. Smith, s.n. (MICH).

Florida: Gainesville, 11.viii.44, coll. & det. W. A. Murrill, no. 32719 (FLAS, TYPE); Gainesville, 28.viii.44, det. W. A. Murrill, no. F9015 (FLAS); Gainesville, 8/3/44, det. W. A. Murrill, no. F32914 (FLAS).

North Carolina: Indian Creek, 23.viii.42, det. B. F. Isaacs, no. 14480 (TENN); Oconee Co., 9.viii.61, det. B. F. Isaacs, no. 27278 (TENN).

41. AGARICUS PROJECTELLUS MURRILL, Mycologia 33: 447. 1941.

TYPE SPECIMEN (holotype, explicit): FLAS, Gainesville, Fla., 3.vi.38, coll. E. West, L. Arnold & W. A. Murrill, det. W. A. Murrill, no. 16219. (!) Isotype: NY, s.n. (!)

Stature of carpophore placomycetoid; mature pileus convex to plane, to 8 cm diam (Murrill), occasionally gibbous, white, more or less cremous on disc (Murrill), pale tan when dried; surface smooth or covered with minute floccose scales; dried flesh to 1.5 mm thick at disc, thinning to < 1 mm at margin; margin projecting to 5 mm. Lamellae (mature) deep chocolate brown, free, to 5 mm deep. Stipe equal to more or less bulbous, to 8 cm long, appearing fibrous, concolorous with pileus; ring median, somewhat appendiculate, dull gold when dried.

Hyphae of pileus cuticle interwoven, usually repent; pileocystidia loosely fasciculate or scattered, 3.0-7.5 μm diam, unbranched; hyphae of pileus flesh mostly highly inflated, (3.0-6.0)10.7-18.5 μm diam, without clamp connections, thin-walled. Lamella trama irregular; hyphae 2.3-

12.2 μ m diam, occasionally slightly inflated; basidia 6.0-7.5 x 13.8-24.5 μ m, 4-sterigmate, without clamp connections; cystidia lacking. Hyphae of stipe surface above ring 3.0-12.2 μ m diam, parallel, tightly packed. Hyphae of ring 6.0-12.2 μ m diam. Cells of universal veil (stipe surface below ring) inflated, to 29.0 μ m diam, without clamp connections, thin-walled, hyaline.

Spores (4.5)6.0-7.5 x 3.8-5.3 μ m, broadly ellipsoid to subglobose; lacking germ pore (SEM); wall dark brown, 0.6 μ m thick; apiculus minutely papillate, hyaline or indiscernible.

Schaeffer macrochemical reaction: negative.

Observations: Although outwardly resembling *A. campestris*, *A. projectellus* can be distinguished by its cellular universal veil tissue, widely projecting margin, lack of cheilocystidia and generally smaller spores. Murrill compared the two species, mentioning also that *A. projectellus* has much whiter immature lamellae than *A. campestris*.

The species may be found in pastures or open grassy areas (*teste* Murrill). It is apparently edible, being easily confused with *A. campestris*. It is currently known only from Florida.

Specimens examined:

Florida: Gainesville, 3.vi.38, coll. E. West, L. Arnold & W. A. Murrill, det. W. A. Murrill (FLAS, no. 16219, TYPE; NY, s.n., Isotype); Gainesville, 2.vi.38, det. W. A. Murrill, no. F16431 (FLAS); Gainesville, 11.vi.44, det. W. A. Murrill, no. F19341 (FLAS); Gainesville, 14.vi.44, det. W. A. Murrill, s.n. (NYS); Gainesville, --.44, det. W. A. Murrill, s.n. (NCU); Gainesville, 21.vi.44, det. W. A. Murrill, s.n. (BPI); Gainesville, 25.iii.44, det. W. A. Murrill, s.n. (BPI).

42. AGARICUS SUBARVENSIS MURRILL, Lloydia 5: 151. 1942.

TYPE SPECIMEN (holotype, explicit): FLAS, Lake Warburg, Alachua Co., Fla., 17.ii.39, coll. J. R. Watson & W. A. Murrill, det. W. A. Murrill, no. 19253. (!)

Stature of carpophore placomycetoid; mature pileus convex to expanded or broadly umbonate, to 8 cm diam (Murrill), pallid (Murrill), gray when dried; surface, except disc, covered with rosy-avellaneous scales (Murrill), dried flesh to 3 mm thick at disc, thinning to < 1 mm at margin. Lamellae (mature) deep chocolate brown, free, to 2 mm deep. Stipe bulbous to slightly tapering upward, to 12 cm long, appearing fibrous, white (Murrill), concolorous with pileus when dried; ring more or less appendiculate, superior when adhering to stipe, gray-gold when dried.

Hyphae of pileus cuticle interwoven, usually repent; pileocystidia fasciculate, 3.0-7.5 μm diam, unbranched; hyphae of pileus flesh 5.5-24.5 μm diam, occasionally inflated, without clamp connections, thin-walled. Lamella trama irregular; hyphae 3.0-7.5 μm diam, uninflated; basidia 4.5-7.5 x 10.7-21.5 μm , 4-sterigmate, without clamp connections; cystidia lacking. Hyphae of stipe surface above ring 3.0-18.5 μm diam, parallel, tightly packed. Hyphae of ring 3.0-15.3 μm diam. Cells of universal veil (stipe surface below ring) inflated, to 30.5 μm diam, without clamp connections, thin-walled, hyaline.

Spores 4.5-6.0(7.5) x (3.0)4.5-5.5 μm , subglobose to broadly ellipsoid; wall dark brown, 0.6 μm thick; apiculus indiscernible.

Schaeffer macrochemical reaction: negative.

Observations: A rare species with highly variable spores, *A. subarvensis* is distinctive for its broadly umbonate pileus and lack of scales on the disc. Several collections contain notes by Murrill mentioning a white cap with a straw-colored disc; this apparently is quite distinctive in the fresh condition.

The species is found in rich, open areas (*teste* Murrill) and is currently known only from Florida. Edibility is unknown.

Specimens examined:

Florida: Lake Warburg, 17.ii.39, coll. J. R. Watson & W. A. Murrill, det. W. A. Murrill, no. 19253 (FLAS, TYPE); Gainesville, 28.iv.43, det. W. A. Murrill, no. F25776 (FLAS); Gainesville, 22.v.43, det. W. A. Murrill, no. F16414 (FLAS); Watson's Grove, 2.ii.45, det. W. A. Murrill, no. F8812 (FLAS); Gainesville, 22.v.43, det. W. A. Murrill, no. F17459 (FLAS).

Acknowledgements

Gratitude is expressed to Dr. Ronald H. Petersen for his many helpful suggestions during the course of this work. Photographs were taken by Dr. L. R. Hesler.

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New and interesting Dematiaceous hyphomycetes from Florida

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A new species of Corynespora Güssow, C. obclavata sp. nov., is described from Serenoa sp. and compared with a similar species, C. lanneicola Deight. & M.B. Ellis. A nomenclatural change, Arthrinium arundinis (Cda) comb. nov. (syn. Gymnosporium arundinis Cda) is made. Two species with a limited number of reports, Virgariella oblonga Matsushima and Cordella johnstonii M.B. Ellis, are recorded together with 5 additional cosmopolitan taxa.

During the Second International Mycological Congress in August-September, 1977, an opportunity was taken by many mycologists to collect in the vicinity of the meeting site. A number of interesting fungi were found on the University of South Florida campus. Some of these have already resulted in at least one other paper (Sutton, 1978). This contribution reports an additional new species from this locality and 7 other taxa. Unless otherwise indicated, all specimens cited were collected by B. J. Dyko on 30 Aug. 1977 at the University of South Florida campus, Tampa, Florida, U.S.A. The holotype of C. obclavata is deposited in herb. IMI.

Arthrinium arundinis (Corda) Dyko & Sutton, comb. nov.

Basionym: Gymnosporium arundinis Corda, Icones Fung., 2, p. 1 (1838).

For additional synonyms see Ellis (1965).

Teleomorphosis: Apiospora montagnei Saccardo. Nuovo G. bot. ital. 7: p. 306. (1875). For synonyms and a detailed description see Hudson (1963).

This fungus is common on graminaceous hosts and is truly cosmopolitan. Collections at IMI number well over 100 specimens

from tropical and temperate regions of Europe, Africa, Asia, Australian subcontinents, North and South America.

Corda described the conidial state of this fungus in 1838 as Gymnosporium arundinis from Czechoslovakia. It is this name which provides the earliest specific epithet for the anamorphosis. Hudson (1963), while in Jamaica, obtained single ascospore isolates of Apiospora montagnei from Saccharum officinarum. These isolates produced a Papularia state consistent with the diagnosis of P. arundinis (Cda) Fr. Ellis (1965) listed Papularia Fr. as a synonym of Arthrinium Kunze ex Fr. He assigned the conidial state of A. montagnei to Arthrinium and provided an extensive list of synonyms but did not make a formal transfer of the specific epithet from Gymnosporium to Arthrinium. As this fungus is frequently encountered as the anamorphosis, we propose the formal transfer of the name to Arthrinium.

The conidia of A. arundinis are of the same size range as those produced by A. sacchari (Speg.) M.B. Ellis. The two fungi may, however, be differentiated by the diameter of their conidiophores. Those of A. arundinis are about 0.5μ in diameter whereas in A. sacchari they are $1-1.5\mu$ diameter.

On decaying grass leaves, Prug-Kré, Czechoslovakia, leg. Corda, det. Corda, Herbarium Cryptogamologicum no. 155522 as Gymnosporium arundinis, PR, IMI 113368, type; on dry stipules of Bambusa sp., IMI 227802 a.

Cordella johnstonii M.B. Ellis. C.M.I. Mycol. Pap. 103: 31-33 (1965).

Ellis (1971) reported this fungus from a single collection of culms from Bambusa blumeana from Malaya. The collections at IMI presently include material from Bambusa spp. in Great Britain and Burma. This is the first report of the species from the U.S.A. Cordella is characterised by setae and the variable diameter of the conidiophores, two features which readily distinguish its species from those in Arthrinium.

On dry stipules of Bambusa sp., IMI 227803.

Corynespora cassicola (Berk. & Curt.) Wei. C.M.I. Mycol. Pap. 34: 5 (1950). For additional synonyms see Hughes (1958).

This taxon is cosmopolitan but especially abundant in tropical climates where it is often responsible for leaf spots on a wide variety of hosts (Ellis & Holliday, 1971). The collections at IMI number well over 100 and come from tropical and subtropical regions of Africa, Asia, North and South America.

On Serenoa serrulata, Univ. S. Fla., B.C. Sutton, 1 Sept. 1977, IMI 215976 b.

Corynespora obclavata Dyko & Sutton, sp. nov.

Coloniae superficiales, effusae, nigrae. Mycelium immersum vel superficiales, sparsum, ex hyphis ramosis, septatis, laevibus, brunneis, compositum. Conidiophora macronemata, mononemata, singula vel 20 in caespitulis aggregata, recta vel flexuosa, non ramosa, brunnea, laeves, cylindrica, septata, 54-210 x 4-6.5 μ . Cellulae conidiogenae treticae, in conidiophoris incorporatae, terminales, per porum apicalem prolificantes, subhyalinae vel brunnea, laeves, cylindrica, apicem versus spatulatae. Conidia solitaria, sicca, acrogena, simplicia, laevia, obclavata, apicem versus abrupte attenuata, rostrata, 4-6 euseptata, raro distoseptata, 3 cellulis basibus brunneis, 2 cellulis apicalibus pallide brunneis vel subhyalinis, 32-62.5 μ longa (cellulis apicalibus inclusa) x 9.5-11 μ .

In petiolis emortuis Serenoe sp., University South Florida campus, Tampa, Fla., U.S.A., B.J. Dyko, 30 Aug. 1977, IMI 227679, holotypus.

Colonies superficial, effuse, black. Mycelium immersed and superficial, sparse, composed of branched, septate, smooth, hyaline to dark brown hyphae. Conidiophores macronematous, mononematous, single or caespitose in groups of up to 20, straight or flexuous, unbranched, brown, smooth, cylindrical, septate, 54-210 x 4-6.5 μ . Conidiogenous cells monotretic, integrated, terminal, percurrently proliferating, sub-hyaline to brown, smooth, cylindrical, becoming spatulate towards the apex. Conidia solitary, dry, acrogenous, simple, smooth, obclavate, tapering abruptly to a rostrate apex, 4-6 euseptate, occasionally distoseptate, lower 3-4 cells medium brown, upper two cells sub-hyaline to pale brown, 32-62.5 μ long (including the rostrate apex) x 9.5-11 μ .

On dead petioles of Serenoa sp., IMI 227679, holotype; on Serenoa serrulata, Univ. S. Fla., B.C. Sutton, 1 Sept. 1977, IMI 215975 g, IMI 215976 b.

This taxon is very similar to C. lanneicola Deighton & M.B. Ellis which was described on dead branches of Lannea afzelii from Sierra Leone (Ellis, 1957). The latter fungus, however, has consistently distoseptate conidia which taper to obtuse apices; the distosepta are not evident from Ellis's (1971) figures. The conidiogenous cells in C. lanneicola are cylindrical, do not swell at the apex and proliferate at closer intervals than those seen in C. obclavata. Corynespora obclavata appears to be sufficiently

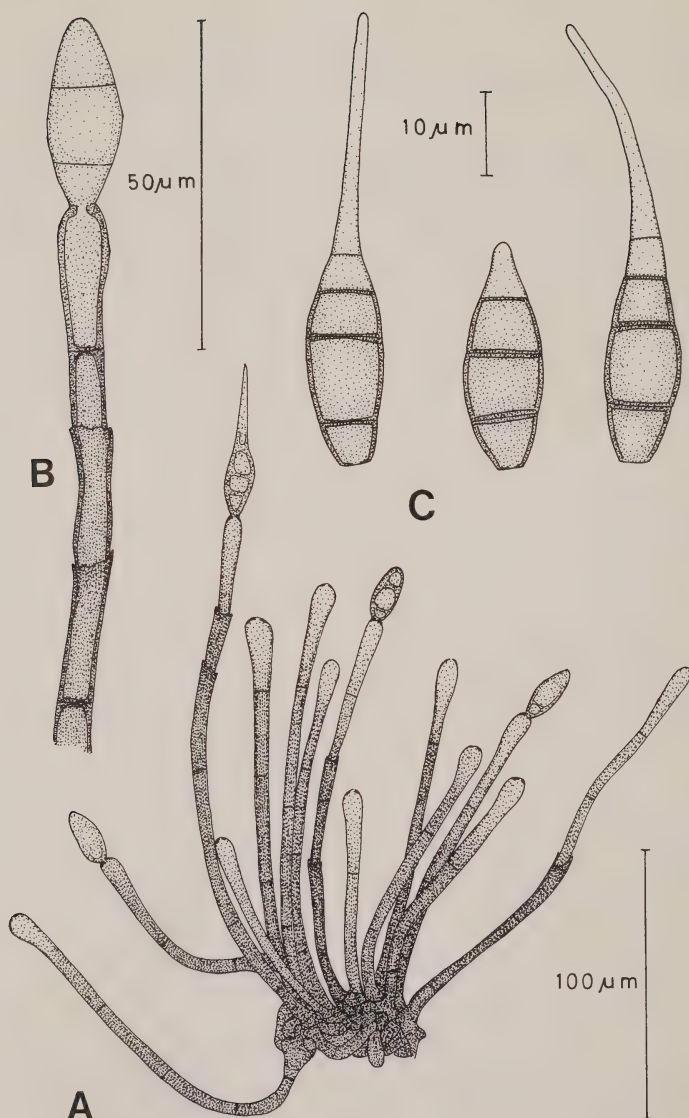


Figure 1. *Corynespora obclavata*. A. Habit sketch showing arrangement of conidiophores. B. Conidiogenous cell apex showing precurrent proliferations, tretic apex and developing conidium. C. Conidia.

distinct from the remaining species in the genus to cause no difficulty in identification.

Dendryphiella vinosa (Berk. & Curt.) Reisinger. Bull. Trimest. Soc. mycol. Fr. 84: 27-39 (1968).

The ubiquity of this species is reflected by collections at IMI which number well over 100 specimens predominantly on herbaceous hosts from temperate and tropical regions of Europe, Africa, Asia, Australian subcontinent, North and South America.

The genus differs from Dendryphon by showing a slight swelling at the apices of the conidiogenous cells and at the nodes of the conidiophores. The branching of the conidiophore is also generally much more restricted than that seen in Dendryphon.

On decaying leaves of Musa sp., IMI 227801.

Dendryphon comosum Wallr. Fl. Crypt. Germ. 2: 300 (1933).

Ellis (1971) reports this common species on dead stems of herbaceous plants in Europe, but the fungus may also be found on decaying wood. This taxon is represented by more than 120 collections from the U.K., Czechoslovakia, Eire, Belgium, India, Switzerland, Germany and now the U.S.A.

In this species, the conidiophore branches profusely at the apex giving it a tree or brush like appearance. The conidiogenous cells are tortuous and cylindrical, thus distinguishing them from Dendryphiella vinosa.

On decaying leaves of Musa sp., IMI 227799.

Periconia byssoides Pers. ex Mérat. Nouv. Fl. Environs Paris, Ed. 2, 1: 18-19 (1821)

This is common on dead herbaceous material and in leaf spots where it is usually associated with other fungi. The IMI herbarium contains well over 100 specimens from temperate and tropical regions of Europe, Africa, Asia, Australian subcontinents, North and South America.

On dry stipules of Bambusa sp., IMI 227802 b.

Virgariella oblonga Matsushima. Icones Microfungorum a Matsushima lectorum. Kobe, Japan. p. 163 (1975).

This interesting fungus has only been reported from the type locality in Japan (Matsushima, 1975). The dimensions given in the original description are $8-16 \times 4.5-7.5\mu$, whereas those of our material measured $9.5-13 \times 6.5-9\mu$. Additionally, the original illustrations show distinct denticles at the apices of the conidiogenous cells; our material tends not to have prominent denticles. We feel, however, the differences between the original description and our material are small and insufficient to warrant separation into a taxon distinct from V. oblonga.

Acknowledgements

We wish to thank Dr. J. L. Crane for reading this manuscript.

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PHIALEA GRANIGENA, AN OLDER NAME FOR GLOEOTINIA TEMULENTA

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During my studies in the Sclerotiniaceae of Fennoscandia for the forthcoming flora, "Nordic Macromycetes," I had the opportunity to examine an old collection of *Phialea granigena* Quélet in herb. UPS, labelled "*Phialea* (seminis) *granigena* Q, Tillous 15-20 Juin - 81 leg. Quélet," growing on caryopses of *Bromus erectus*. The material is very possibly part of authentic material reported by Quélet (1883) from France. Microanatomical investigations clearly show that the material is conspecific with *Gloeotinia temulenta* as circumscribed by Wilson, Noble and Gray (1954).

The microstructure of *P. granigena* is also in full accordance with that of the type specimens of *Sclerotinia secalincola* Rehm examined by me - (an Samen von *Secale cereale* L. auf schlecht bestandenen Feldern, in der Ober Lausitz bei Göda, 27. Mai 1900, leg. G. Feurich, ex herb. Rehm (S)) - a species earlier placed in synonymy with *G. temulenta* by Rehm himself (Rehm 1915). The Quélet specimens provide an older name for *G. temulenta* and the necessary new combination is:

GLOEOTINIA GRANIGENA (Quélet) Schumacher, *comb. nov.*

Basionym: *Phialea granigena* Quélet, C. R. Ass. franç. Av. Sci. 11: 407, 1883.

Synonyms: *Sclerotinia granigena* (Quélet.) Saccardo, Syll. Fung. 8: 198, 1889.

Phialea temulenta Prill. & Delacr., Bull. Soc. mycol. Fr. 8: 22, 1892.

Ciboria (*Stromatinia*) *temulenta* (Prill. & Delacr.) Prill. & Delacr., Bull. Soc. mycol. Fr. 9: 200, 1893.

Stromatinia temulenta (Prill. & Delacr.) Prill. & Delacr. in Prilleux, Malad. Plant. Agric., p. 453, 1897.

Sclerotinia temulenta (Prill. & Delacr.) Sacc. & Sacc. in Saccardo, Syll. Fung. 18: 42, 1906.

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- Stromatinia secalincola* (Rehm) Boud., Hist. class. Disc. d'Europe, p. 109, 1907.
- Phialea mucosa* Gray, Trans. Brit. Mycol. Soc. 25: 329, 1942.

A single record of the species from Norway, on caryopses of *Elytrigia repens* (L.) Nevski (Sör-Trøndelag. Trondheim. UTM grid ref. NR 6224, 25. June 1975 Å. Erlandsen (TRH)) extends the known host-range of this species to the four closely related graminous host genera, *Bromus*, *Lolium*, *Secale* and *Elytrigia*.

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MYXOMYCETES FROM ECUADOR

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The myxomycete flora of Ecuador is poorly known. Apart from the recent monograph by Farr (1976) on neotropical Myxomycetes, the only publication dealing specifically with species from the Ecuadorian mainland during recent decades appears to be that by Harling (1967). From the Galápagos Islands, which politically belong to Ecuador, Myxomycetes have been listed by Bonar (1939), Martín (1948), Eliasson (1971), and Farr (1976).

The rise of the land from sea level to an elevation of nearly 6,300 m has created diverse ecological conditions and resulted in a great variety of vegetation types, ranging from xerophytic scrub to wet, lowland rain forest, to high-Andean páramos, subpáramos, and "snow" areas.

The present paper reports some myxomycete field collections made by K. P. Dumont and colleagues in July and August, 1975 and by U. Eliasson in January and February, 1977. One or more specimens taken by H. Lugo in 1968,

M. Neuendorf in 1972, and B. Sparre in 1967, as well as a couple of G. W. Prescott's collections in BPI, are also included. Altogether forty-seven species are listed, twenty-two of which are reported from Ecuador for the first time. *Didymium leoninum* and *D. ochroideum* represent new records for South America, the former being listed for the second time from the Western Hemisphere. This brings the total number of Myxomycetes reported for mainland Ecuador to sixty-five species in twenty-one genera. However, since the country is still virtually unexplored floristically, many species no doubt remain to be found.

For the sake of brevity, the collecting localities have been numbered and are described below. Each species citation is followed by locality number and collector's number. All specimens marked with a cross (+) are new records for Ecuador. Eliasson's collections are deposited in GB while Dumont's specimens are in NY, with small portions of some in BPI (these are marked with an asterisk). The specimens have been determined by U. Eliasson and M. L. Farr. K. P. Dumont gratefully acknowledges NSF grant GB 28593 which provided financial support for his field work in collecting the cited specimens. U. Eliasson acknowledges the Anna and Gunnar Vidfelt Foundation for financial support of his travels in Ecuador.

Localities

1. Prov. Guayas, Cerro Azul, ca 10 km W of Guayaquil, dry seasonal shrub vegetation, alt. ca 50 m.
2. Prov. Los Ríos, hacienda Clementina on Río Pita, ca 20 km NE of Babahoyo, secondary monsoon forest and cultivated land, alt. ca 20 m.
3. Prov. Los Ríos, Santo Domingo-Quevedo road, Río Palenque Biological Station, 56 km from Quevedo, alt. ca 220 m.
4. Prov. El Oro, Piñas-Santa Rosa road, above El Placer, partly primary rain forest, alt. 400-1000 m.
5. Prov. El Oro, Piñas-Santa Rosa road, ca 7 km from Piñas, alt. ca 1400 m.
6. Prov. El Oro, Piñas-Santa Rosa road, 21 km from Piñas toward Machala, alt. ca 1400 m.
7. Boundary of Pichincha and Imbabura prov., Quito-Otavalo road via Minas, ca 90 km from Quito, alt. ca 3500 m.
8. Prov. Pichincha, Quito-Otavalo road via Minas, ca 66 km from Quito, alt. ca 2200 m.

9. Prov. Pichincha, Quito-Nono-Nanegal road, ca 36 km from Quito, alt. ca 2700 m.
10. Prov. Pichincha, Aloag-Santo Domingo road, ca 55 km from Santo Domingo, alt. ca 2000 m.
11. Prov. Pichincha, Aloag-Santo Domingo road, ca 19 km from Santo Domingo, alt. ca 870 m.
12. Prov. Pichincha, Quito-Chiriboga-Santo Domingo road, ca 75 km SW of Chillogallo, alt. ca 1900 m.
13. Prov. Pichincha, Quito-Chiriboga-Santo Domingo road, ca 49 km SW of Chillogallo, alt. ca 2400 m.
14. Prov. Pichincha, Quito-Chiriboga-Santo Domingo road, ca 39 km SW of Chillogallo, alt. ca 2400 m.
15. Prov. Pichincha, Quito-Chiriboga-Santo Domingo road, ca 37 km SW of Chillogallo, alt. ca 2500 m.
16. Prov. Pichincha, Quito-Chiriboga-Santo Domingo road, ca 24 km SW of Chillogallo, alt. ca 3400 m.
17. Prov. Pichincha, Quito-Chiriboga road, between Chiriboga and San Juan, montane rain forest and shrub vegetation, alt. 1900-2000 m.
18. Prov. Pichincha, Aloag-Santo Domingo road, 35 km from Aloag, alt. ca 2000 m.
19. Prov. Pichincha, near "La Plata" copper mine, 3 km above Palo Quemado which is ca 10 km above Toachi, alt. ca 1700 m.
20. Prov. Pichincha, Toachi-Palo Quemado road, 2 km above Toachi, alt. ca 1100 m.
21. Prov. Cotopaxi, Latacunga-Quevedo road, ca 87 km from Latacunga, alt. ca 3300 m.
22. Prov. Cotopaxi, Latacunga-Quevedo road, ca 98 km from Latacunga, alt. ca 2700 m.
23. Prov. Tungurahua, Pueblo Río Negro (near Río Pastaza), alt. ca 1250 m.
24. Prov. Tungurahua, Ambato-Puyo road, ca 50 km from Ambato, alt. ca 1800 m.
25. Prov. Tungurahua, Ambato-Puyo road, ca 59 km from Ambato, alt. ca 1800 m.
26. Prov. Chimborazo, Bucay-Riobamba road, ca 5 km from Bucay (General Elizalde), alt. ca 900 m.
27. Prov. Azuay, Cuenca-Girón road, Portete del Tarqui, montane scrub, alt. 2600-2700 m.
28. Prov. Loja, Catacocha-Macará road, ca 12 km SW of Catacocha, montane scrub, alt. ca 1400 m.
29. Prov. Loja, Catacocha-Macará road, ca 8 km S of Empalme, dry *Ceiba* savannah, alt. ca 1900 m.
30. Prov. Loja, Catacocha-Macará road, ca 16 km N of Macará, seasonal forest, alt. ca 1300 m.

31. Prov. Loja, Catacocha-Macará road, ca 6 km N of Macará, moist ravine, alt. ca 1000 m.
32. Prov. Loja, Loja-Catacocha road, ca 2 km S of Las Chinchas, dense shrubby woods, alt. ca 2400 m.
33. Prov. Loja, Loja-Catacocha road, ca 10 km N of Catacocha, grasslands and woods, alt. ca 2100 m.
34. Prov. Loja, Macará-Cariamanga road, 10-15 km E of Macará, seasonal forest, alt. ca 700 m.
35. Prov. Napo, Santa Rosa (near Río Napo), alt. 400 m.
36. Prov. Napo, Coca-Armenia Vieja road, ca 15 km S of Coca (Puerto Francisco de Orellana), secondary vegetation and disturbed rain forest, alt. ca 250 m.
37. Prov. Napo, Coca-Lago Agrio road, Las Sachas, ca 40 km NE of Coca, virgin and disturbed rain forest, alt. ca 250 m.
38. Prov. Napo, Río Payamino, ca 10 km from the mouth, disturbed primary rain forest and riverside vegetation, alt. ca 250 m.
39. Prov. Pastaza, Mera, alt. ca 1100 m.
40. Prov. Pastaza, Mera-Pindo trail, ca 1 km N of Mera, rastros and potreros, alt. ca 1100 m.
41. Prov. Pastaza, Mera-Colonia Játiva road, 1-3 km NW of Mera, alt. ca 1100 m.
42. Prov. Pastaza, Ambato-Puyo road, ca 2 km from Puyo, alt. ca 1300 m.
43. Prov. Morona-Santiago, Limón-Méndez road, ca 5 km from Limón (General Plaza Gutierrez), alt. ca 1300 m.
44. Prov. Morona-Santiago, Limón-Méndez road, ca 9 km from Limón, alt. ca 1300 m.
45. Prov. Morona-Santiago, Limón-Méndez road, ca 13 km from Limón, alt. ca 1000 m.
46. Prov. Morona-Santiago, Méndez-Macas road, ca 7 km from Méndez, alt. ca 800 m.
47. Prov. Zamora-Chínchipe, Zamora-Loja road, ca 1 km from Zamora, alt. ca 1200 m.

LIST OF SPECIES

CERATIOMYXALES Martin ex Farr & Alexop.

- Ceratiomyxa fruticulosa* (Müll) Macbr. -- 1 (Eliasson 3242); 12 (on monocot stem, *Dumont*, Carpenter, & Buriticá *EC-338); 19 (on twig, D. C. B. EC-504); 20 (on log, D. C. B. *EC-651); 43 (on branch, D. C. B. EC-2046, EC-2047).
- +*C. sphaerosperma* Boedijn -- 41 (E. 3251).

LICEALES Jahn

Liceaceae Rost.

+*Licea biforis* Morgan -- 39 (*Lugo s n*, GB).

L. ?operculata (Wing.) Martin -- 7 (on leaves, D. C. B. *EC-2453). A scant specimen consisting of 1 1/2 sporangia, and fitting the description fairly well. *L. operculata* has not been reported for Ecuador.

Reticulariaceae Rost.

Tubifera microsperma (B. & C.) Mart. -- 27 (E. 3274).

Lycogala epidendrum (L.) Fr. -- 13 (on wood D. C. B. *EC-327); 26 (on log, D. C. B. EC-1548); 37 (E. Aethalia immature, not collected.)

Cribrariaceae Rost.

+*Cribraria tenella* Schrader -- 31 (E. 3292 B).

Dictydium cancellatum (Batsch) Macbr. -- 40 (E. 3245); 41 (E. 3249).

TRICHIALES Macbr.

Arcyria cinerea (Bull.) Pers. -- 3 (on twig, D. C. B. EC-857); 10 (on soil, D. C. B. EC-427); 11 (on wood and soil, D. C. B. EC-739); 35 (*Neuendorf s n*, herb. GB); 37 (E. 3264); 38 (E. 3272); 41 (E. 3248); 44 (D. C. B. EC-2057); 45 (on twig, D. C. B. EC-2133).

A. denudata (L.) Wettst. -- 10 (on log, D. C. B. *EC-432; on soil, and twig, D. C. B. EC-426); 20 (on soil and moss, D. C. B. EC-641); 26 (on bark, D. C. B. EC-1545); 31 (E. 3293); 44 (on grass leaf, D. C. B. EC-2055); 43 (on branch, D. C. B. EC-2041).

A. ?insignis Kalchbr. & Cke. -- 20 (on branch, D. C. B. *EC-629). Not known from Ecuador.

Hemitrichia calyculata (Speg.) Farr -- 3 (on log, D. C. B. EC-819); 17 (E. 3266); 20 (on herbaceous stem, D. C. B. EC-630; on twig, EC-654); 25 (on twig, D. C. B. *EC-1359); 30 (E. 3239); 36 (E. 3252, 3255, 3258, 3259); 37 (E. 3262); 38 (E. 3273); 40 (E. 3244). The substrate for EC-630 is unusual and noteworthy, since the species commonly occurs on dead wood.

H. serpula (Scop.) Rost. -- 20 (on wood, D. C. B. *EC-649 and *EC-570).

Perichaena chrysosperma (Currey) A. Lister -- 28 (E. 3281).

PHYSARALES Macbr.

Physaraceae Rost.

+*Craterium aureum* (Schum.) Rost. -- 33 (E. 3291).

- C. leucocephalum* (Pers.) Ditmar -- 13 (on leaf, D. C. B. EC-271, poor); ?47 (D. C. B. EC-1847).
 +*Fuligo septica* (L.) Wigg. -- 36 (E. 3256).
 +*Physarella oblonga* (Berk. & Curt.) Morgan -- 37 (E. 3263).
 +*Physarum* sp. (Close to *P. bivalve* Pers.) -- 24 (on leaf, D. C. B. EC-1307).
P. sp. (Possibly close to *P. nudum* Macbr.) -- 47 (on monocot stem, D. C. B. EC-1845, badly parasitized).
P. bogoriense Racib. -- 30 (E. 3285).
P. cinereum (Batsch) Pers. -- 29 (E. 3284).
 +*P. compressum* Alb. & Schw. -- 3 (on monocot stem, D. C. B. *EC-846; on bark, *EC-850, EC-851); 5 (on branch, D. C. B. EC-1604); 8 (on vine, D. C. B. EC-2428); 11 (on herbaceous stem, D. C. B. EC-744); 16 (E. 3268); 20 (on leaf, D. C. B. *EC 647); 23 (Neuendorf s n, herb. GB); 26 (on herbaceous stem, D. C. B. EC-1544); 45 (on petiole of *Cecropia* sp, D. C. B. EC-2136).
 +*P. didermoides* (Pers.) Rost. -- 35 (Neuendorf s n, herb. GB).
P. melleum (Berk. & Br.) Masee -- 19 (on leaf, D. C. B. EC-512).
P. nutans Pers. -- 19 (on herbaceous stem, D. C. B. EC-506); 27 (E. 3276, 3277); 28 (E. 3282); 34 (E. 3240); ?42 (on branch, D. C. B. *EC-1423).
 +*P. pusillum* (Berk. & Curt.) G. Lister -- 17 (E. 3265, 3269, 3295); 22 (on herbaceous stem, D. C. B. *EC-1189; on leaf, EC-1192); 41 (E. 3246, 3250); 43 (on debris, D. C. B. EC-2042).
 +*P. serpula* -- 26 (on leaf, D. C. B. *EC-1551).
P. stellatum (Masee) Martin -- 3 (on herbaceous stem, D. C. B. EC-854; on wood, *EC-856); 12 (on leaf, D. C. B. *EC-337); without data (on bark, Prescott *F. 48).
P. viride (Bull.) Pers. -- 9 (on bamboo culm, D. C. B. *EC-2298).

Didymiaceae Rost.

- +*Diderma effusum* (Schw.) Morgan -- 22 (on leaf, D. C. B. EC-1190); ?25 (on living vine, D. C. B. EC-1360).
 +*D. hemisphaericum* (Bull.) Hornem. -- 7 (on leaves, D. C. B. EC-2454); 17 (E. 3267); 25 (on herbaceous stem, D. C. B. EC-1254, poor); 30 (E. 3238); 32 (E. 3279); 33 (E. 3290).
Didymium sp. (Close to *D. squamulosum*) -- 7 (on debris, D. C. B. *EC-2456); 45 (on leaf, D. C. B. *EC-2134).

- +*D. clavus* (Alb. & Schw.) Rab. -- 4 (E. 3237); 7 (on twig, D. C. B. EC-37); 37 (E. 3286); 44 (on herbaceous stem, D. C. B. *EC-2050).
- D. ?difforme* (Pers.) S. F. Gray -- 5 (on leaf, D. C. B. EC-1608; fits except for spore size, 8-10 μ m); ?20 (on leaf, D. C. B. EC-635, slightly aberrant; EC-650, slightly immature).
- +*D. floccosum* Martin, Thind, & Rehill -- 33 (E. 3288). This collection agrees with the two deviating specimens discussed by Farr (1976, p. 225) under *D. floccosum*. Although the sporangia have unusually thick stipes, this specimen may be accommodated here for the present.
- D. iridis* (Ditmar) Fr. -- ?12 (on wood, D. C. B. EC-335, one sporangium); 29 (E. 3294).
- +*D. leoninum* Berk. & Br. -- 20 (on herbaceous stem, D. C. B. *EC-637). Second record for Western Hemisphere and first record for South America. The first record of the species from the Western Hemisphere was a collection from Jamaica, discussed earlier (Farr, 1974).
- D. minus* (A. Lister) Morgan -- 20 (on leaf, D. C. B. *EC-643).
- D. nigripes* (Lk.) Fr. -- 3 (on herbaceous stem, D. C. B. EC-860); 11 (on grass leaves, D. C. B. EC-737); 20 (on leaf, D. C. B. EC-626, EC-636, *EC-648); 33 (E. 3280, 3289); 42 (on leaf, D. C. B. *EC-1427; on grass, EC-1420); 43 (on leaf, D. C. B. EC-2048); 46 (on herbaceous stem, D. C. B. EC-2205; on leaf, *EC-2223).
- +*D. ochroideum* G. Lister -- 14 (on herbaceous stem, D. C. B. EC-226). New for South America.
- D. squamulosum* (Alb. & Schw.) Fr. -- 5 (on herbaceous stem, D. C. B. EC-1603); ?15 (on leaf, D. C. B. EC-165); ?24 (on culms of *Equisetum* sp., D. C. B. EC-1248, poor); 28 (E. 3283); 31 (E. 3271); 45 (on leaf, D. C. B. EC-2132).
- +*D. verrucosporum* Welden -- 3 (on herbaceous stem, D. C. B. *EC-820); 6 (on leaf, D. C. B. *EC-1734); 19 (on leaf, D. C. B. EC-638).

STEMONITALES Macbr.

- Comatricha typhoides* (Bull.) Rost. -- 18 (on bamboo culm, D. C. B. EC-2416); 40 (E. 3243).
- +*Lamproderma scintillans* (Berk. & Br.) Morgan -- 21 (on leaf, D. C. B. EC-1070); 33 (E. 3287).
- Stemonitis axifera* (Bull.) Macbr. -- 27 (E. 3275, 3278).

S. fusca Roth. -- 26 (on wood, D. C. B. *EC-1543); 36 (*E.* 3257, 3260, 3261); without data (on bark, Prescott *F-48).

+*S. herbatica* Peck -- 2 (*Sparre s n*, herb. S).

S. splendens Rost. -- 41 (*E.* 3247).

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CONTRIBUTION TO THE STUDY OF LICHENS FROM KIVU (ZAÏRE), RWANDA AND BURUNDI. III, VEZDAEA, A NEW GENUS FOR AFRICA

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SUMMARY

The genus *Vezdaea* Tsch.-Woess & Poelt is recorded as new for Africa where it is represented by a new species : *Vezdaea foliicola* Sérusiaux sp. nov.

RESUME

Le genre *Vezdaea* Tsch.-Woess & Poelt est découvert pour la première fois en Afrique, où il est représenté par une espèce nouvelle : *Vezdaea foliicola* Sérusiaux sp. nov.

The collection of foliicolous lichens recently made in Kivu (Zaire), Rwanda and Burundi has already proved to be mostly interesting (Sérusiaux 1978). This paper deals with the discovery of the genus *Vezdaea* in this material. Detailed information about the area and its ecogeographical position can be found in Lambinon & Sérusiaux (1977).

(**) Aspirant au Fonds National de la Recherche Scientifique.

Vezdaea foliicola Sérusiaux sp. nov.

Thallus crustaceus, supracuticulariter crescens, cinereo-viridis. Ascocarpia rotunda vel saepe irregularia, 0.8-1.0 mm diam., leviter convexa, bruneola, interdum leviter tomentosa. Excipulum nullum, hypothecium indistinctum, "hymenium" hyalinum. Asci numerosi, membranis incrassatis, 8-spori. Paraphyses ramosae anastomosantesque, reticula circum ascos formantes. Sporae 1-septatae, ellipsoideae, 16.5-19 x 4-6 μm , leviter sed distincte verrucosae. Algae ad Chlorococcaceae probabiliter pertinentes. Holotypus : Lambinon 71/1115 (LG).

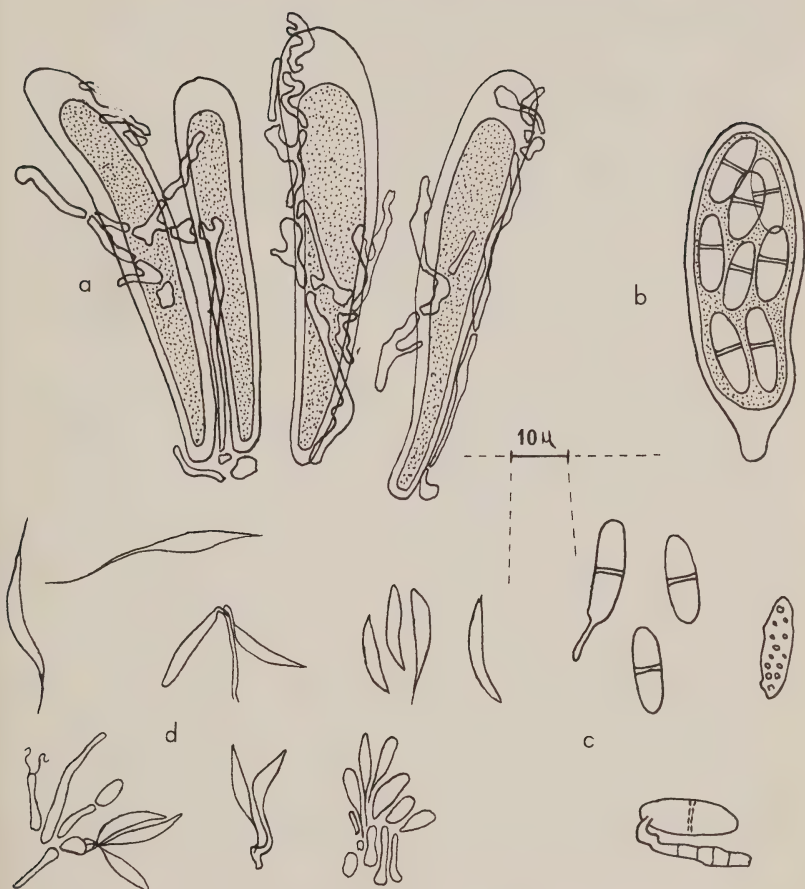
Thallus epiphyllous, growing on the leaf cuticle, at least in adult stage, + circular but with an often irregular periphery (due to the thallus disappearance), up to 12 mm diam., not exceeding 10 μm thick, ashen green. Ascocarps circular or often irregular in shape and outline, 0.8-1.0 mm diam., slightly convex but giving the impression of being flattened, brownish, when young covered by a minute whitish tomentum (this might in fact be the ascus tips), without margin or in young stages surrounded by intricate whitish hyphae giving the margin a woolly aspect. Excipulum lacking but a few peripheral hyphae suggest an excipulum-like structure, hypothecium ill-defined, the ascus and paraphyses are found in loose tufts, there is no binding hymenial gel and therefore there is no real hymenium.

Asci abundant, clavate, thick-walled, with a double layer and a swollen tholus (especially clear in young asci); paraphyses branched and anastomosed, composed of flattened cells and forming a net work around each ascus. Spores : 8/ascus, 1-septate, not constricted at the septum, (14-) 16.5-19 x 4-6 μm (average of 17.5 x 5 μm), ellipsoid to slightly fusiform, with obtuse ends, minutely verrucose when completely mature (verrucae distinctly refringent).

Pycnidiospores produced only in certain young parts of the thallus (obviously lacking in large areas of the thallus, usually in old ones), fusiform with tapering ends, simple, 14-16 x 25-35 μm , budding on long and + straight sterigmata.

Algae : micareoid : globose, green, 5-10 μm diam., cells grouped in a common gelatinous membrane, probably belonging to the Chlorococcaceae.

Zaire : Central east Afromontane district : Massif du Kahuzi, env. km 37 de la route Bukavu-Walikale, alt. 2300 m, partie inférieure de la forêt de bambous, épiphyllé sur *Culcasia* sp., Lambinon 71/1115 (holotypus : LG, isotypus : GZU, herb. Vězda).



Vezdaea foliicola Sérusiaux, holotypus. a : young hymenium; b : ascus with spores; c : spores (a cluster of 3 immature spores, one completely mature with verrucae, a young one parasitized by an unknown fungus); d : pycnidiospores.

The genus *Vezdaea* has been recently recognized (Tschermak-Woess & Poelt, 1976) to accomodate an european species [*Pachyascus byssaceus* (Vězda) Vězda (= *Catillaria byssacea* Vězda)], whose particularities were earlier described by Vězda (1963, 1970). Tschermak-Woess and Poelt also have shown that this taxon formely was described as *Lecidea aestivalis* by Ohlert and should therefore be named *Vezdaea aestivalis* (Ohlert) Tsch.-Woess & Poelt. Four other species have been placed in the genus as well (Poelt & Döbbeler, 1975, 1977) : *V. leprosa* (James) Vězda, *V. retigera* Poelt & Döbbeler, *V. rheocarpa* Poelt & Döbbeler and *V. stipitata* Poelt & Döbbeler. Those papers provide information on morphology, anatomy, ecology and taxonomical position of that genus of Lecideaceae.

The taxon discovered in Lambinon african material clearly belongs to that genus because of its ascocarps structure, ascus anatomy, lack of excipulum, branched and anastomosed paraphyses forming a network around individual asci and bicellular spores.

It can be easily distinguished from the species of the sect. *Stipitatae* Poelt & Döbbeler (*V. stipitata* and *V. leprosa*) by its sessile ascocarps and from the only species of the sect. *Rheocarpae* Poelt & Döbbeler (*V. rheocarpa*) by its paraphyses which reach the ascus tips (in *V. rheocarpa*, paraphyses are scarce and do not exceed half the ascus length). *V. foliicola* seems to belong to the sect. *Vezdaea* and can be distinguished from *V. retigera* by its spores (unicellular in *V. retigera*) and from *V. aestivalis* by its ascocarps color, pycnidiospores, as well as its distribution and ecology. As a matter of fact *V. aestivalis* has flesh-colored ascocarps, bacilliiform pycnidiospores 10-12 x 2 μ m and is encountered in Europe overgrowing living or dead mosses and liverworts.

I am mostly grateful to Dr. A. Vězda who made several improvements to my manuscript. Drs. V. Demoulin (Liège), J. Lambinon (Liège), D.H. Pfister (Cambridge), J. Poelt (Graz) and A. Vězda acted as referees for this paper.

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NOTES ON HYPHOMYCETES. XXVI. *UNCISPORA HARROLDII* GEN. ET SP. NOV.

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ABSTRACT

Uncispora harroldii Sinclair and Morgan-Jones, a new genus and species, is described from a collection made on twigs of *Betula nigra* L. in Alabama.

INTRODUCTION

An illustrated account is given of a dematiaceous hyphomycete collected on twigs of *Betula nigra* in Alabama for which we know of no hitherto published name. In some aspects of conidiophore and conidium morphology, the fungus resembles species of *Sporidesmium* Link ex Fr. and related genera. In common with these, it possesses conidiophores bearing holoblastic, monoblastic, integrated, non-cicatrizated conidiogenous cells and conidia which are broadly truncate at their base. It differs from them in that its conidiophores are sometimes branched and synnematus and in possessing conidia that are uniquely hooked distally.

TAXONOMIC PART

Uncispora gen. nov.

Deuteromycotina, Hyphomycetes.

(Etym. *Uncus*, hook et Gr. *spora*, spore)

Coloniae late effusae, sparsae, pallide brunneae vel brunneae, pilosae. Mycelium plerumque in substrato immersum, ex hyphis ramosis, septatis, hyalinis vel pallide brunneis compositum. Conidiophora macronemata, synnemata vel in fasciculata aggregata, erecta, recta vel flexuosa, simplicia vel ramosa, brunnea, laevia, modice crasse tunicata, septata. Cellae conidiogenae in conidiophoris incorporatae, monoblasticae, terminales, determinatae, cylindricae. Conidia solitaria, simplicia, septata, subhyalina

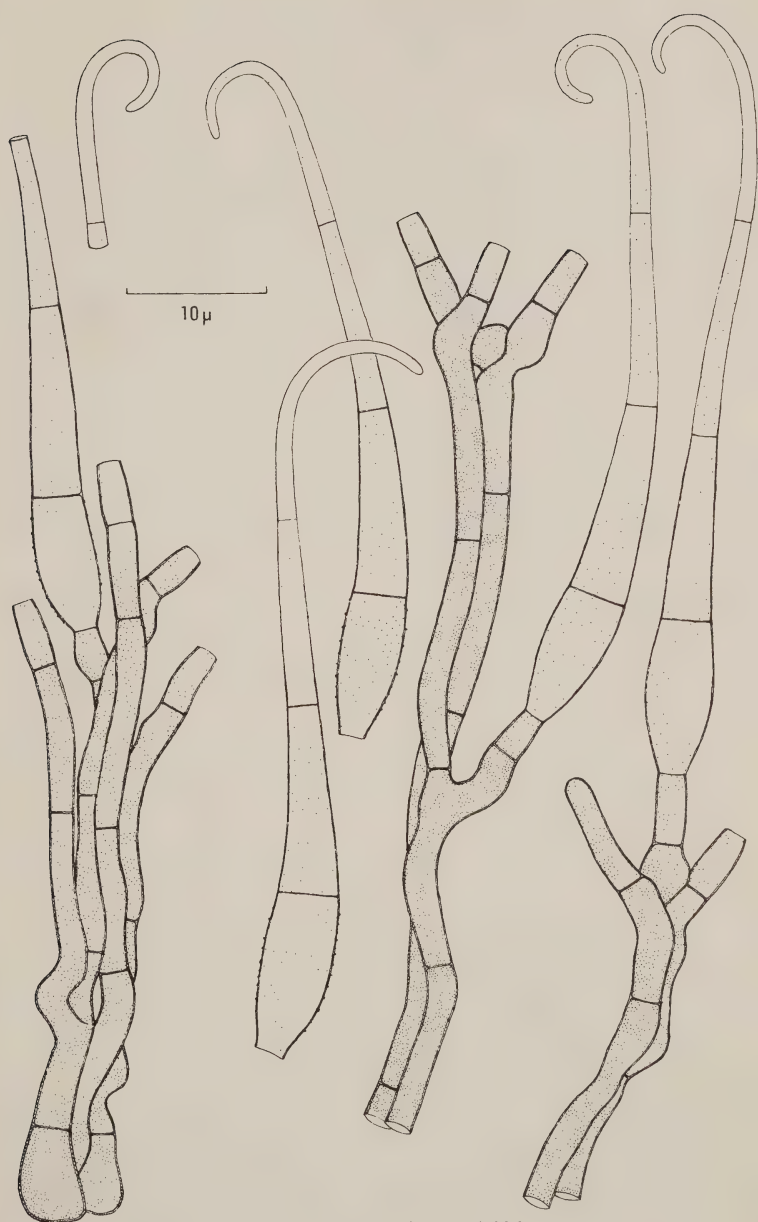


FIGURE 1. *Uncispora harroldii*.
Conidiophora and conidia.

vel pallide brunnea, laevia sed verruculosa ubi matura, obclavata, rostrata et hamata, ad basem truncata.

Species typica: *Uncispora harroldii* Sinclair and Morgan-Jones.

Colonies broadly effuse, thin, pale brown to brown, hairy. Mycelium mostly immersed in the substratum, composed of branched, septate, hyaline to pale brown hyphae. Conidiophores macronematous, synnematus or arranged in fascicles, erect, straight or flexuous, simple or branched, brown, smooth, moderately thick walled, septate. Conidiogenous cells integrated, monoblastic, terminal, determinate, cylindrical. Conidia solitary, simple, septate, subhyaline to pale brown, smooth or verruculose at maturity, obclavate, hooked towards the apex, truncate at the base.

Uncispora harroldii sp. nov. (Fig. 1)

Coloniae late effusae, sparsae, pallide brunneae vel brunneae, pilosae. Mycelium plerumque in substrato immersum, ex hyphis ramosis, septatis, hyalinis vel pallide brunneis, laevibus, $1.5 - 2.5\mu$ crassis compositum. Conidiophora macronemata, synnemata vel in fasciculata aggregata, erecta, recta vel flexuosa, simplicia vel ramosa, pallide brunnea vel brunnea, sursum pallidiora, laevia, modice crasse tunicata, septata, $35 - 68 \times 2.5 - 4\mu$. Cellae conidiogenae in conidiophoris incorporatae, monoblasticae, terminales, determinatae, cylindricae. Conidia solitaria, simplicia, 3 - 4 septata, subhyalina vel pallide brunnea, laevia sed verruculosa ubi matura, obclavata, rostrata et hamata, ad basem truncata, $62 - 78\mu$ longa, $4 - 5\mu$ crassa, basi $2.5 - 3\mu$ apice $1 - 1.5\mu$ lata,

In ramunculis emortuis Betulae nigrae, Tuskegee National Forest, Macon County, Alabama, May 15, 1978, Susan A. Harrold, AUA, holotypus.

The new species is named in honor of Ms. Susan A. Harrold, its collector.

Colonies broadly effuse, thin, mostly inconspicuous, pale brown to brown, hairy. Mycelium mostly immersed in the substratum, composed of branched, septate, smooth, hyaline to pale brown hyphae, $1.5 - 2\mu$ wide. Conidiophores macronematous, synnematus or sometimes in a fascicle of a few, very rarely single, frequently intertwining, erect, straight or more often flexuous, simple or branched, pale to mid brown, slightly paler towards the apex, smooth, moderately thick-walled, septate, $35 - 68 \times 2.5 - 4\mu$. Conidiogenous cells integrated, monoblastic, terminal, determinate, cylindrical. Conidia solitary, simple, 3 to 4-septate, subhyaline to very pale brown, smooth or with the walls of the lower cell minutely verruculose at maturity, obclavate, rostrate and hamate, truncate at the base, $62 - 78\mu$ long, $4 - 5\mu$ in the broadest part, $2.5 - 3\mu$ wide at the

base, 1 - 1.5 μ wide at the apex.

On bark of dead twigs of *Betula nigra* L, North America.

Collection examined: on *B. nigra*, Tuskegee National Forest, Macon County, Alabama, May 15, 1978, Susan A. Harrold, AUA, type.

The conidia of several species of *Sporidesmium* show a tendency to curve towards the tip, particularly those of *S. hamatum* M.B. Ellis, which are hamate. The flexuous, branched, intertwining conidiophores of *Uncispora*, however, serve to distinguish it from *Sporidesmium*.

ACKNOWLEDGEMENT

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NOTES ON HYPHOMYCETES. XXVII. *MYCOGONE PSILOCYBINA*, A NEW MYCOPARASITIC SPECIES

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ABSTRACT

Mycogone psilocybina Morgan-Jones and Gray, a new species, is described from collections on carpophores of *Psilocybe cubensis* (Earle) Singer in Alabama.

INTRODUCTION

In the course of a survey of mycoparasitic fungi occurring on carpophores of members of the Agaricales in Alabama several fungi have been discovered of which there is apparently no documentation in the literature. Among these is an organism isolated from fruit bodies of *Psilocybe cubensis* growing on cow dung in open meadows. It belongs to the genus *Mycogone* Link but is clearly distinct from the other species of this genus described hitherto. A description of the fungus is provided herein and a new name is established for it. Some account of the host-parasite relationship is given.

TAXONOMIC PART

Mycogone psilocybina sp. nov. (Figs. 1 and 2)

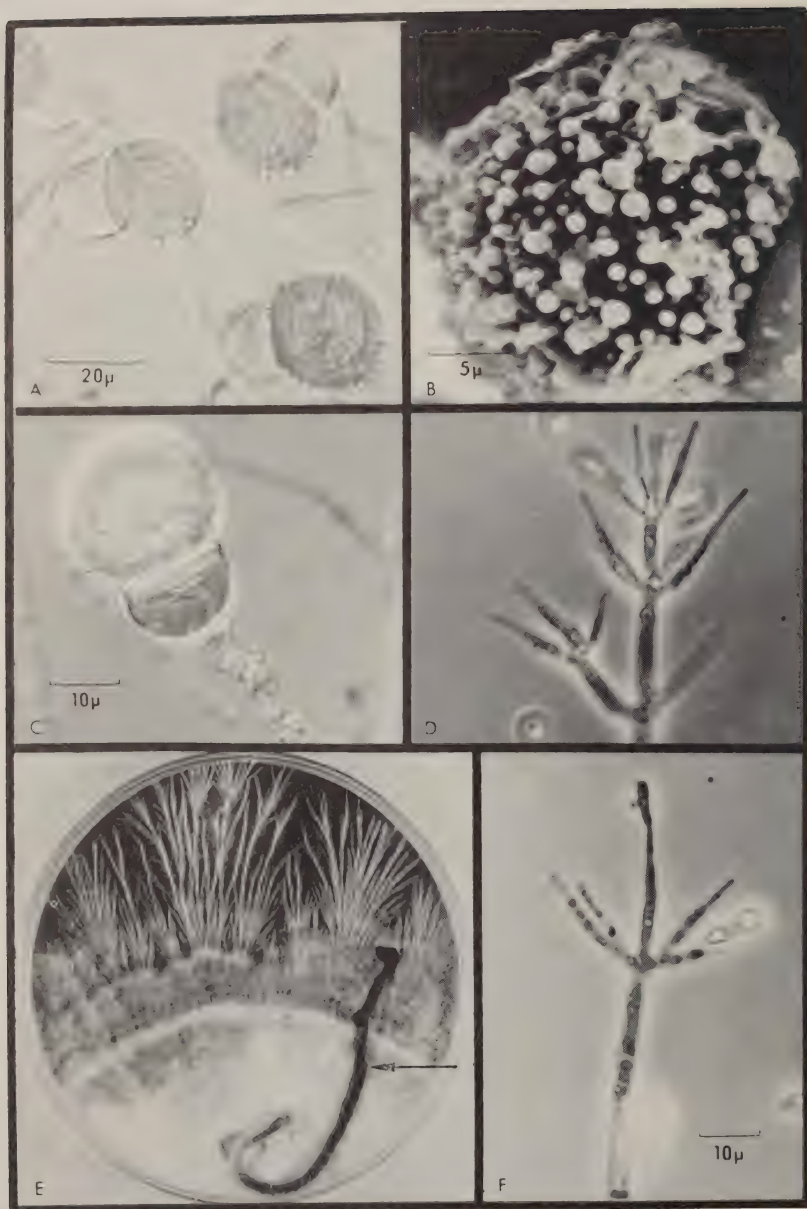
Coloniae effusae, pallide cinnamomeae vel subroseae, sparsae, floccosae. Coloniae in agar decocto tuberorum post 5 dies 25°C ad 5 cm. diametro, celeriter crescentes, lanosae vel floccosae, cinnamomeae vel pallide badiae; reverso ochraceo-brunneo. Mycelium plerumque superficiale, partim in substrato immersum, ex hyphis ramosis, septatis, hyalinis, levibus, 4 - 7 μ crassis compositum. Cellae aleurioconidiogenae monoblasticae, discretiae vel in hyphis incorporatae, terminales et intercalares, laeves, cylindricae vel ampulliformes. Aleurioconidia solitaria, sicca, acrogena, 1 septata: cellula superna sphaerica, crassitunicata, verrucosa, ochracea, 26 - 25 μ in diam.; cellula inferne semisphaerica, laevia, sybhyalina, 15 - 18 μ in

diam., 10 - 14 μ alta. In hyphis eisdem ac *Mycogone* vel sejunctis orta *Verticillii* fructificatio. Conidiophora semimacronemata, mononemata, recta vel flexuosa, laevia, septata, hyalina, interdum ramosa. Cellulae conidiogenae monophialidicae, discretae et verticillatae, determinatae, hyalinae, subulatae, laeves, 18 - 34 X 2.5 - 3 μ , ad apicem lu crassae. Conidia ellipsoidea vel ovoidea, laevia, hyalina, aseptata vel 1 septata, plerumque guttulata, 7 - 17 X 2 - 5 μ .

Ad carpostomata viva *Psilocybe*, Tuskegee National Forest, Macon County, Alabama, September 20, 1977, Dennis J. Gray, AUA, holotypus.

Colonies effuse, pale cinnamon to pinkish, thin, floccose. Colonies on PDA growing rapidly, lanose, or floccose, cinnamon to pale chocolate brown, becoming somewhat yellowish with the production of aleurioconidia, reverse pale yellowish-brown, 5 cm. in diameter after 5 days at 25 $^{\circ}$ C. Colonies on 2% malt agar growing well, floccose, appreciably thinner than on PDA, pale chocolate brown, reverse dull grayish, 4 cm. in diameter after 5 days at 25 $^{\circ}$ C. Colonies on Czapek-Dox agar extremely thin, 3.5 cm in diameter after 5 days at 25 $^{\circ}$ C. Mycelium mostly superficial on carpophores, composed of cylindrical, flexuous, branched, septate, hyaline, smooth-walled, 4 - 7 μ wide hyphae. Aleurioconidium-bearing hyphae micronematous or semi-macronematous, short, branched or unbranched. Aleurioconidium-bearing cells integrated, terminal on lateral branches of vegetative hyphae or intercalary, monoblastic, determinate, cylindrical or somewhat ampulliform. Aleurioconidia solitary, dry acrogenous, divided by a septum, with a large, spherical, thick-walled, verrucose, yellowish-brown, 26 - 27 μ wide upper cell and a smaller, smooth-walled, subhyaline, basal cell, 15 - 18 μ wide, 10 - 14 μ long. A *Verticillium*-like phialidic state is also present. Conidiophores semimacronematous, stipe straight or flexuous, hyaline, smooth, with a terminal verticil of up to six phialides and short lateral branches bearing similar heads but with usually fewer phialides. A few phialides are sometimes formed laterally on the main stipe immediately beneath septa. Conidiogenous cells monophialidic, discrete, arranged verticillately, determinate, narrowly ampulliform, with long narrow necks, without collarettes, 18 - 34 X 2.5 - 3 μ . Conidia produced in basipetal succession at the tips of the phialides, variable, ovoid to ellipsoid, hyaline, nonseptate, or more rarely 1-septate, 7 - 17 X 2 - 5 μ , the larger conidia frequently

FIGURE 1. *Mycogone psilocybina*. A and C, Aleurioconidia (Nomarski differential interference microscopy); B, surface of upper cell of aleurioconidium (scanning electron microscopy); D and F, phialoconidiophores; E, plate culture of *M. psilocybina* and *P. cubensis* (arrow indicates aborted carpophore of *P. cubensis*).



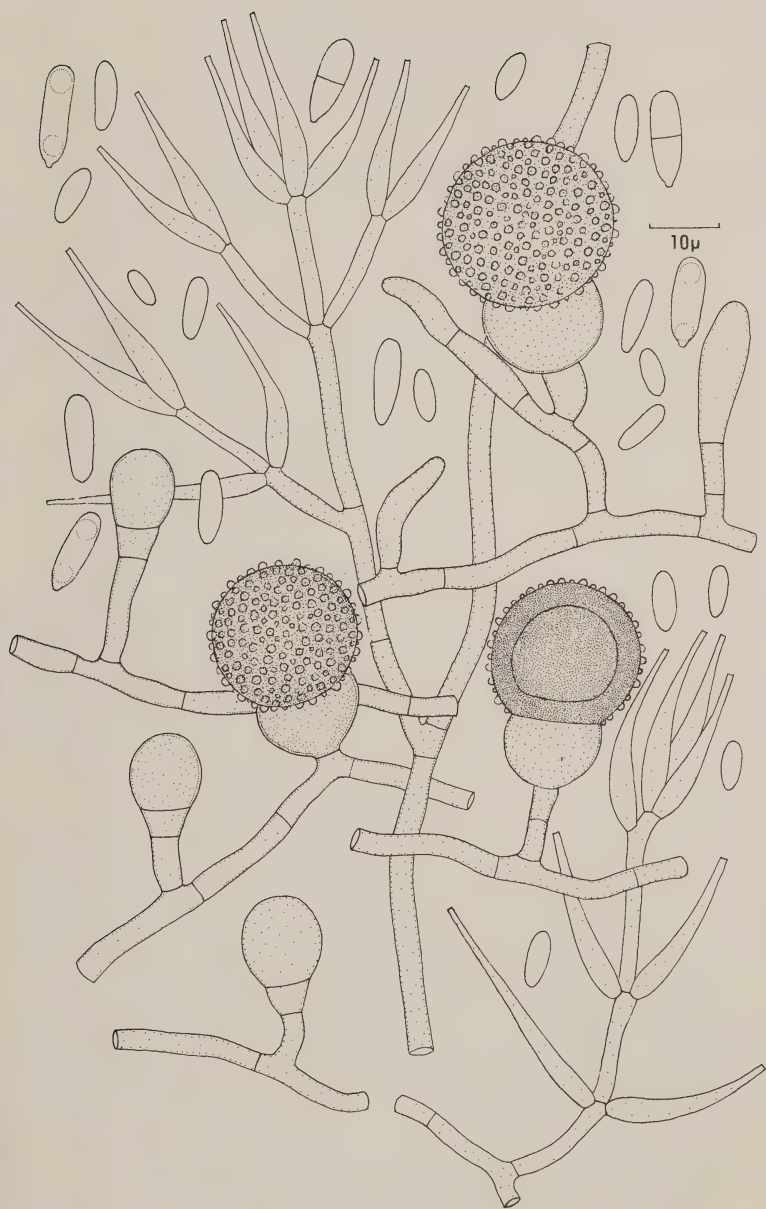


FIGURE 2. *Mycogone psilocybinia*

biguttulate and bearing a minute papilla at their extreme base.

On carpophores of *Psilocybe cubensis* (Earle) Singer; North America.

Collection examined: on *P. cubensis*, Tuskegee National Forest, Macon County, Alabama, September 20, 1977, Dennis J. Gray, AUA, type. Culture derived from this collection ATCC 36389.

DISCUSSION

In colony habit *M. psilocybina* resembles *M. cervina* Ditmer particularly in the production of a compact layer of aleurioconidia. The aleurioconidia are however much larger and more reddish in color than those of *M. cervina* and the phialoconidia are shorter. *M. psilocybina* is distinct from *M. rosea* Link ex Link by the discrete very large warts on the upper cell of the aleurioconidia.

Examination of the aleurioconidia of *M. psilocybina* with a scanning electron microscope has shown the warts or protuberances on the wall of the upper cell to be variable in size and to be irregularly spaced (Fig. 1B). There is occasional coalescence of individual protuberances of different size.

In nature the mycelium of *M. psilocybina* covers a large area of the carpophore of the host fungus and some disruption was noticeable in the collection on which our studies are based. Several carpophores were partly aborted. In culture *M. psilocybina* has adverse effects on the growth and sporulation of *P. cubensis*. In plate culture on PDA supplemented with yeast extract a zone of inhibition is apparent where colonies of the two fungi approach each other (the culture of *P. cubensis* [ATCC 36412] used in our growth studies was isolated by us from a healthy carpophore obtained at the same locality as those infected by *M. psilocybina*). After a time inhibition is overcome and the mycelia intermingle. The mycelium of *P. cubensis* however assumes a blue coloration in the zone overlapping the *M. psilocybina* colony. We consider this to indicate some disruption since the carpophores of *P. cubensis* stain blue when bruised. Furthermore all carpophore initials produced become rapidly covered by *M. psilocybina* and quickly abort (Fig. 1E). Healthy sporulating carpophores are produced by *P. cubensis* on this medium when grown alone. Further studies of the host-parasite relationship are underway.

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We have had the benefit of consultation with Dr. Walter Gams. Dr. J. Leland Crane reviewed the manuscript.

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NOTES ON HYPHOMYCETES. XXVIII.

VERONAEA BAMBUSAE SP. NOV.

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ABSTRACT

Veronaea bambusae Morgan-Jones, a new species, is described and illustrated from a collection made on leaves of *Bambusa* sp. in Alabama.

INTRODUCTION

A fungus collected on leaves of *Bambusa* sp. in Alabama has been determined to be an undescribed species of *Veronaea* Ciferri and Montemartini. It resembles *Veronaea apiculata* (Miller, Giddens and Foster) M.B. Ellis and *Veronaea musae* M.B. Ellis. It differs from the former in possessing smooth-walled, ellipsoid conidia and from the latter in having appreciably smaller conidia.

TAXONOMIC PART

Veronaea bambusae sp. nov. (Fig. 1).

Coloniae effusae, griseo-brunneae, pilosae. Mycelium partim superficiale et partim in substrato immersae, ex hyphis ramosis, septatis, subhyalinis vel pallide brunneis, levibus, 1.5 - 2.5 μ crassis compositum. Conidiophora macronemata, mononemata ex lateribus hypharum oriunda, simplicia vel laxa ramosa, recta vel flexuosa, septata, subhyalina vel pallide brunnea, apicem versus pallidiora, laevia, cicatricibus conidialibus numerosis praedita, usque ad 140 μ longa, 1.5 - 3 μ crassa. Cellae conidiogenae polyblaticae, in conidiophoris incorporatae, terminales vel intercalares. Conidia acropleurogena, ellipsoidea, hyalina vel subhyalina, laevia, 4 - 5 X 1.5 - 2 μ .

In foliis emortuis Bambusae, Chewacla State Park, Lee County, Alabama, April 18, 1978, R. Munsey, AUA, holotypus.

Colonies effuse, greyish brown, hairy. Mycelium partly superficial, partly immersed in the substratum, composed of

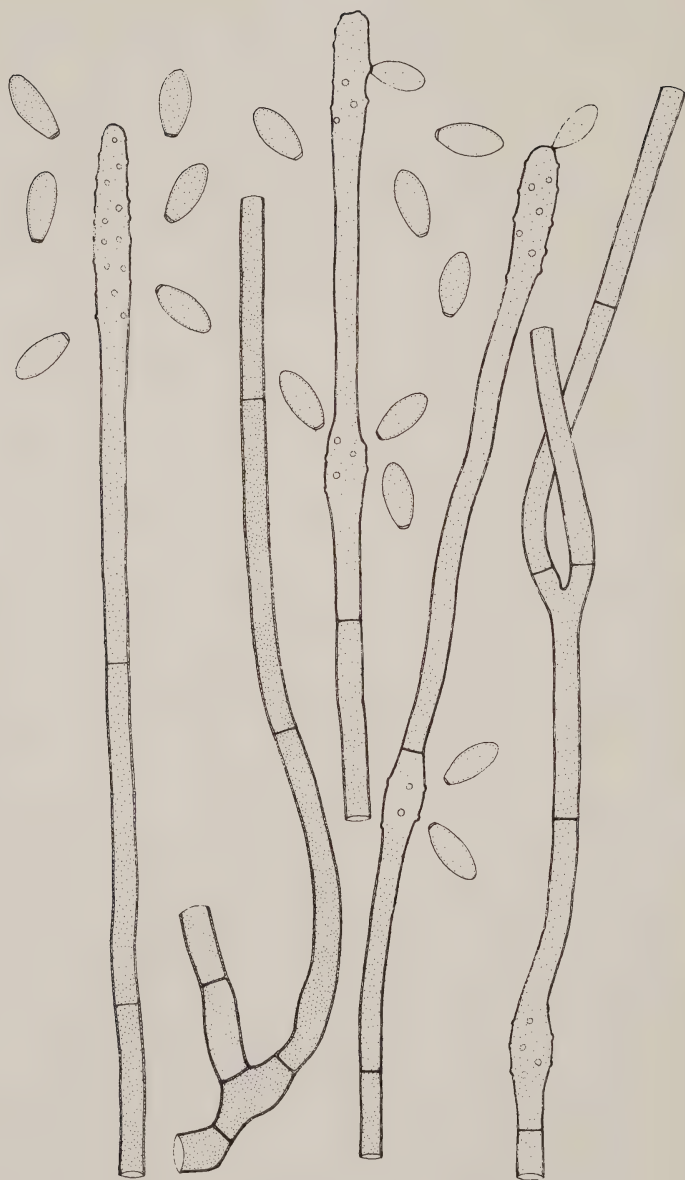


FIGURE 1. *Veronaea bambusae*

branched, septate, subhyaline to pale brown, smooth, 1.5 - 2.5 μ wide hyphae. Conidiophores macronematous, mononematous, arising as lateral branches of the hyphae, simple or loosely branched, straight or flexuous, cylindrical, septate, subhyaline or pale brown, paler towards the apex, smooth, bearing numerous conidial scars which are small and flat, up to 140 μ long, 1.5 - 3 μ thick. Conidiogenous cells polyblastic, integrated, terminal or intercalary, the zone bearing conidia usually noticeably inflated. Conidia acropleurogenous, ellipsoid, hyaline or subhyaline, smooth, with a flat scar at the base, 4 - 5 X 1.5 - 2 μ .

On dead leaves of *Bambusa* sp.; North America.

Collection examined: on *Bambusa* sp., Chewacla State Park, Lee County, Alabama, April 18, 1978, R. Munsey, AUA, type.

In establishing the name of *V. bambusae* I am accepting the concept of the genus *Veronaea* as expounded by Ellis (1976). This in spite of the fact that de Hoog (1977) adopted the name *Ramichloridium* Stahel ex de Hoog for the taxa included by Ellis in *Veronaea*. The small, flat conidiophore scars are a hallmark of *Veronaea*. I remain to be convinced that *Ramichloridium* as conceived by de Hoog, containing as it does some species with distinct denticles on the conidiophore, is a fully satisfactory taxonomic entity.

ACKNOWLEDGMENT

Dr. Richard T. Hanlin, University of Georgia, reviewed the manuscript.

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NOTES ON HYPHOMYCETES. XXIX.
OBSTIPISPORA CHEWACLENSIS GEN. ET SP. NOV.

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ABSTRACT

Obstipispora chewaclensis Sinclair and Morgan-Jones, a new aquatic genus and species, is described from collections made in an Alabama stream.

INTRODUCTION

Although a widespread and extensive aquatic hyphomycete flora, comprising roughly 40 genera and 80 species, is documented in the literature, Ingold (1976) has predicted that twice as many taxa might well eventually be discovered. The abundance of these hyphomycetes in well aerated freshwaters has led to a belief that their biomass exceeds that of other fungi in that aquatic environment.

In the course of a seasonal survey of aquatic hyphomycetes occurring on decomposing leaves of various deciduous trees submerged in a fast flowing stream at Chewacla State Park, Alabama, a number of fungi have been encountered for which there appear to be no established names available. Among these is a fungus which we think to be identical to that illustrated by Matsushima (1975), referred to as *Fungus Imperfectus non nominatus* 1744, collected on decaying leaves of *Sequoia sempervirens* in Japan.

Description and illustration of this fungus are provided herein and a name is proposed for it.

TAXONOMIC PART

Obstipispora gen. nov.

Deuteromycotina, Hyphomycetes.

[Etym. Lat. *Obstipus*, bent forward, et Gr. *spora*, spore]

Fungi aquatici submersi. Mycelium ex hyphis ramosis, septatis, hyalinis, laevibus compositum. Conidiophora micronemata, mononemata, hyalina, filiformia, erecta, recta vel flexuosa, laevia, septata. Cellae conidiogenae monoblasticae, in conidiophoris incorporatae, terminales. Conidia solitaria, hyalina, laevia, septata, cylindrica, flexa.

Species typica: *Ostipispora chewaclensis* Sinclair and Morgan-Jones.

Submerged aquatic fungi. Mycelium composed of branched, septate, hyaline, smooth hyphae. Conidiophores micronematous, mononematous, hyaline, filiform, erect, straight or flexuous, smooth, septate. Conidiogenous cells monoblastic, integrated, terminal. Conidia solitary, hyaline, smooth, septate, cylindrical, bent.

Obstipispora chewaclensis sp. nov. (Fig. 1).

Fungus aquaticus. Mycelium plerumque in substrato immersum, ex hyphis ramosis, septatis, hyalinis, laevibus 1 - 1.5 μm crassis compositum. Conidiophora micronemata, mononemata, hyalina, filiformia, erecta, recta vel flexuosa, laevia; multiseptata, usque ad 200 μm longa, 1 - 1.5 μm crassa. Cellae conidiogenae monoblasticae, in conidiophoris incorporatae, terminales. Conidia solitaria, hyalina, laevia, septata, cylindrica, characteristic biflexa, interdum torta, 83 - 140 X 1 - 3 μm .

In foliis putrescentibus Populi in flumine, Chewacla State Park, Lee County, Alabama, August 12, 1978, R. C. Sinclair, BPI, holotypus.

Aquatic fungus. Mycelium mostly immersed in the substratum, composed of branched, septate, hyaline, smooth, 1 - 1.5 μm wide hyphae. Conidiophores micronematous, mononematous, hyaline, filiform, erect, straight or flexuous, smooth, septate, up to 200 μm long, 1 - 1.5 μm wide. Conidiogenous cells monoblastic, integrated, terminal. Conidia solitary, acrogenous, hyaline, smooth, multiseptate (with up to 22 septa), cylindrical, attenuating gradually towards each end, characteristically abruptly bent towards the middle and with a more gradual bend distally establishing two axes at more or less right angles to one another, sometimes twisted, 83 - 140 X 1 - 3 μm , length from base to first bend 40 - 68 μm , obtuse at the apex, subtruncate at the base.

On decaying leaves of *Populus deltoides* Marsh; North America.

Collection examined: on *P. deltoides* submerged in a stream, Chewacla State Park, Lee County, Alabama, August 12, 1978, R. C. Sinclair, BPI, AUA, type.

The leaves (cut out discs) of popular on which the

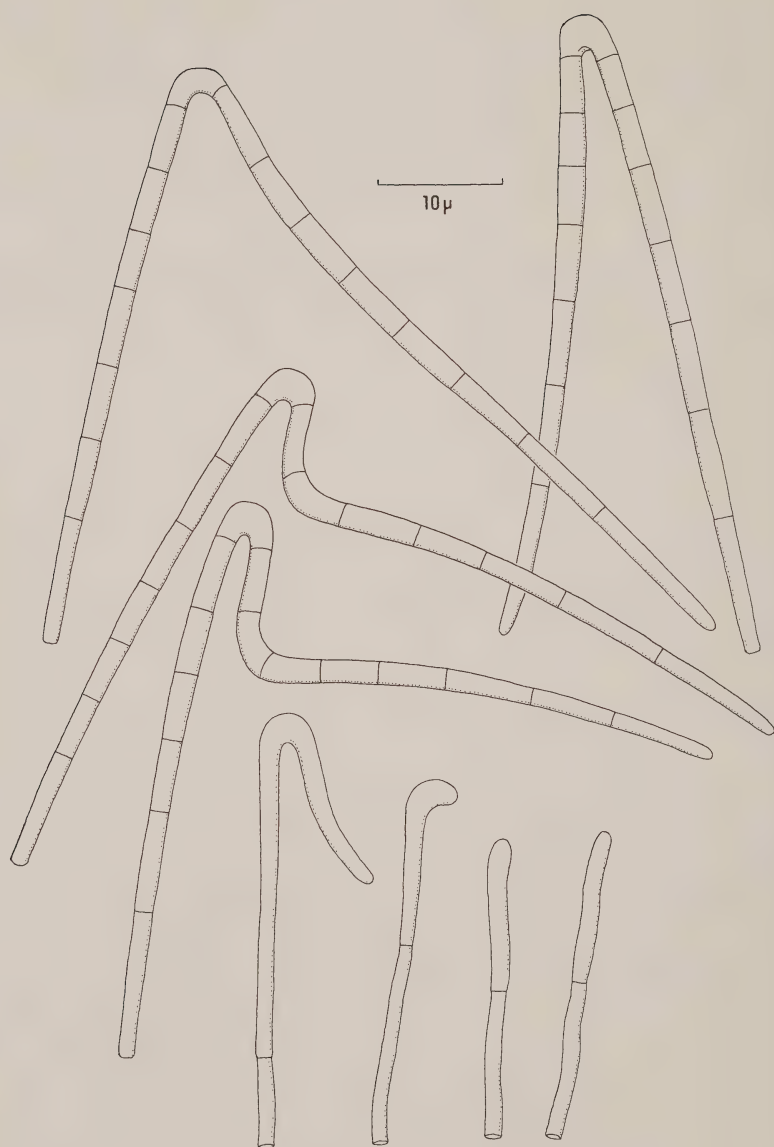


FIGURE 1. *Obstipispora chewaclensis*

fungus was found had been introduced into the stream in fiberglass mesh bags two months prior to collection. Conidia of *O. chewaclensis* were also found on three separate occasions in foam samples taken from two sites during May and July 1978.

There is variation in the degree of bending of the conidia. In some the first bend forms an angle of nearly 180° and the second nearly 90° ; in others the first bend may create a lesser angle and the second bend may be negligible. The septa are at first obscure but as the conidium matures they become increasingly evident.

Matsushima (1975) briefly described and illustrated the conidia of what appears to be the same fungus. This is of interest since his collection was a component of leaf litter fungi of *Sequoia*. Bandoni (1972), Park (1974), Singh and Musa (1977), Webster (1977) and Goos (1978) have also reported the occurrence of known aquatic hyphomycetes in terrestrial habitats.

A closely similar spore type had previously been recorded by Ingold (1956) from surface foam of a river in Ibadan, Nigeria and by Tubaki (1966) from scum in Japan. Tubaki's illustration leaves little doubt that he too had conidia of *O. chewaclensis* and it is not unlikely that Ingold had it although one cannot be absolutely certain on the basis of his figure.

In conidium morphology *Obstipispora* most closely resembles *Anguillospora* Ingold and *Angulospora* Nilsson but its much more definite conidium shape serves to separate it from these two genera.

ACKNOWLEDGMENT

We thank Dr. Richard T. Hanlin, University of Georgia, for reviewing the manuscript.

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AJELLOMYCES AND ITS SYNONYM *EMMONSIELLA*

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SUMMARY

Ajellomyces McDonough et Lewis is emended and *Emmonsella* Kwon-Chung is considered to be a synonym of *Ajellomyces*. *Emmonsella capsulata* Kwon-Chung is transferred to *Ajellomyces* as *A. capsulata* (Kwon-Chung) McGinnis et Katz, comb. nov..

The genus *Ajellomyces* was established by McDonough and Lewis (9) in 1968 to accommodate the perfect state of *Blasatomyces dermatitidis* Gilchrist and Stokes (8). *Ajellomyces dermatitidis* was distinguished from other members of the Gymnoascaceae by the development of thick-walled spiraling hyphae that radiated from a common center in the ascocarp. From these spirals, there arises a network of secondary swollen thin-walled hyphae. The asci, which contain eight globose hyaline ascospores, were described as being globose to subglobose.

In 1972, Kwon-Chung (3) discovered the perfect state of *Histoplasma capsulatum* Darling and established the new genus *Emmonsella* (4) with the single species *E. capsulata*. *Emmonsella* was distinguished from *Ajellomyces* and the other members of the Gymnoascaceae on the basis of its pyriform to clavate asci and network of thin-walled non-swollen secondary hyphae arising from centrally radiating thick-walled spirals. In a later study, Kwon-Chung (5) reported that the ascocarp initials were also distinctive.

Study of the type material, as well as living cultures

of these two fungi, has revealed that *Ajellomyces* and *Emmonsiella* are not different enough to be maintained as separate genera (Table 1). *Ajellomyces* and *Emmonsiella* are considered to be congeneric.

TAXONOMIC PART

Ajellomyces McDonough et Lewis emend. McGinnis et Katz. Type species: *A. dermatitidis* McDonough et Lewis, Mycologia 60:77, 1968.

= *Emmonsiella* Kwon-Chung, Science 177:368, 1972.

Cleistothecia globosa vel in formam stellatam vergentia, lutea; peridii hyphae ex spiris crasse tunicatis, septatis, e centro communi ortis, secundarias hyphas crebras ramosas tenuiter tunicatas e latere producentibus, compositae; asci subglobosi, clavati vel pyriformes, octospori, deliquescentes; ascosporae globosae, hyalinae.

Cleistothecia globose to stellate, tan; peridial hyphae composed of thick-walled, septate spirals arising from a common center, giving forth numerous secondary thin-walled branching hyphae from their sides; asci subglobose, clavate to pyriform, 8-spored, deliquescent; ascospores globose, hyaline.

Accepted species:

1. *Ajellomyces dermatitidis* McDonough et Lewis, Mycologia 60:77, 1968.
2. *Ajellomyces capsulata* (Kwon-Chung) McGinnis et Katz, comb. nov.
= *Emmonsiella capsulata* Kwon-Chung, Science 177:368, 1972.

Herbarium specimens examined:

Original slide preparations of *Ajellomyces dermatitidis* obtained from E. S. McDonough, Marquette University, Wisconsin; BPI 71811, holotype of *E. capsulata*, obtained from the Herbarium, National Fungus Collection, Maryland.

Living cultures studied:

TABLE 1. Summary of the principle taxonomic characteristics of *Ajellomyces* and *Emmonsiaella*.

<i>Ajellomyces</i>		<i>Emmonsiaella</i>
Ascocarp initiation	Illustrated to be contact between 2 swollen cells of unequal size, but believed by McDonough to be contact of 2 morphologically undifferentiated hyphae; hyphae originating from these swollen cells giving rise to the ascocarp; heterothallic.	Reported to be contact between 2 morphologically undifferentiated hyphae, then forming 2 swollen cells of unequal size at site of contact; hyphae originating from these swollen cells giving rise to the ascocarp; heterothallic.
Peridial hyphae	Thick-walled spirals originating from center of ascocarp giving rise to secondary swollen thin-walled hyphae.	Thick-walled spirals originating from center of ascocarp giving rise to secondary non-swollen thin-walled hyphae.
Ascocarp	Globose, subglobose, tan.	Globose, subglobose, tan.
Asci	Subglobose, clavate to pyriform, 8 ascospores.	Subglobose, clavate to pyriform, 8 ascospores.
Ascospores	Globose, smooth, hyaline.	Globose, smooth, hyaline.
Conidia	Holoblastic, solitary on conidiophore.	Holoblastic, solitary on conidiophore.
Monotypic genus	Yes	Yes

NCMH 811-816, single ascospore isolates derived from the type culture of *A. dermatitidis*; NCMH 805-810, single ascospore isolates derived from the type culture of *E. capsulata*. The living cultures were obtained from A. Padhye, Center for Disease Control, Atlanta.

DISCUSSION

McDonough and Lewis (9) illustrated the initiation of the ascocarp of *A. dermatitidis* occurring by the contact of two swollen hyphal cells of unequal size. McDonough believes (personal communication) that the swollen cells actually develop following the contact of two morphologically undifferentiated hyphae. These swollen cells or knobs (Fig. 1) then form a cluster of hyphae from which the characteristic spirals of the genus *Ajellomyces* originate (Fig. 2). Kwon-Chung (5) reported that *A. capsulata* initiates its ascocarps from morphologically undifferentiated hyphae that wind around hyphae of the opposite mating type. She stated that (5) "The tip of the winding hypha and the site where it contacts the opposite hypha soon became swollen, forming knob-like structures. One of the knob-like structures sends out hyphae which then encircles the two knobs several times thus obscuring them. When encircling hyphae are brushed aside, two knobs of unequal size can be clearly seen." In both species, two swollen cells or knobs of unequal size give rise to the cluster of hyphae which eventually gives rise to the radiating spirals. Since details preceeding ascocarp development are uncertain, a cytological investigation of the process leading to plasmogamy in these two species is planned.

In both species, several robust hyphal spirals radiate from a common center towards the periphery of the ascocarp. The inner walls of the spirals of *A. dermatitidis* and

Figs. 1-7. *Ajellomyces dermatitidis* (NCMH 811 x NCMH 813, except 5-6, herbarium specimen of type). 1. Swollen cell occurring during initiation of the ascocarp, 1,250X; 2. Development of spirals from ascocarp center, 500X; 3. Developing swollen secondary peridial hyphae, 1,250X; 4. Mature secondary peridial hyphae, 1,250X; 5-6. Globose to pyriform asci, 1,250X; 7. Mature ascocarp, 200X. Mixed cereal agar, 24°C, 4-6 weeks (except 5-6), in Nomarski differential interference contrast microscopy.

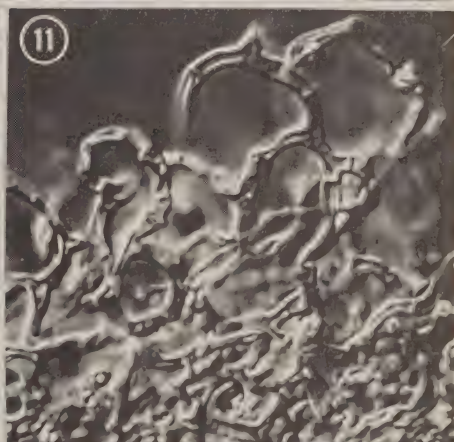
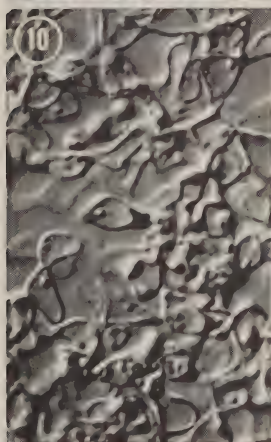


A. capsulata are distinctively thicker than the outer walls (Figs. 8, 9). A network of secondary thin-walled hyphae develops from the spirals in both species. The secondary hyphal network tends to branch dichotomously with some anastomosing hyphal elements. As these hyphae develop in *A. dermatitidis* (Fig. 3), they become repeatedly swollen (Figs. 4, 10). In contrast, the secondary hyphae of *A. capsulata* do not swell but remain parallel-walled (Fig. 11). In both fungi, the mature ascocarp is globose to subglobose in shape and tan in color. The radiating spirals may give the ascocarps a stellate appearance (Fig. 7).

The asci of *A. dermatitidis* were originally reported to be globose to subglobose (9). Examination of McDonough's original slides has shown that the asci are subglobose, clavate to pyriform in shape (Figs. 5-6), as are those of *A. capsulata*. Detailed measurement of the globose ascospores of *A. dermatitidis* and *A. capsulata* by Glick and Kwon-Chung (1) has shown them to be 1.3 - 1.6 μm and 1.2 - 1.5 μm in diameter, respectively. Distinctive projections were also observed by these authors as well as Garrison *et al.* (2) on the ascospore walls by electron microscopy. The ascospores are hyaline.

The conidial states of *A. dermatitidis* and *A. capsulata* consist of solitary holoblastic conidia that develop upon short distinct conidiophores. The conidial state of *A. dermatitidis* is *B. dermatitidis* (Fig. 12) and the conidial states of *A. capsulata* are *H. capsulatum* var. *capsulatum* (Fig. 13) and *H. capsulatum* var. *duboisii* (6). When these fungi are incubated at 37°C on an appropriate medium, they both grow in a yeast-like morphology that is identical to their parasitic form in animal tissue.

Figs. 8, 10, 12. *Ajellomyces dermatitidis* (NCMH 811 X NCMH 813). Figs. 9, 11, 13. *A. capsulata* (BPI 71811, except 13, NCMH 805). 8. Mature spirals, 1,250X; 9. Mature spirals, 1,250X; 10. Mature secondary peridial hyphae, 1,250X; 11. Mature secondary peridial hyphae, 1,250X; 12. *Blastomyces* conidial state, 1,250X; 13. *Histoplasma* conidial state, 500X. 8, 10, 12-13 mixed ceral agar, 24°C, 4-6 weeks, all in Nomarski differential interference contrast microscopy.



The genus *Ajellomyces* is similar to *Apinisia* La Touche (7). Both of these genera of the Gymnoascaceae have spirals associated with their ascocarps. Unlike *Apinisia*, the spirals in *Ajellomyces* arise from a common center within the gymnothecium. The ascocarps of *Apinisia* are white and a *Chrysosporium* Corda state is typically present.

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THE GENUS *PSEUDOGYMNOASCUS*

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SUMMARY

The genus *Pseudogymnoascus* Raillo is discussed and reduced to two species; *P. vinaceus* Raillo & *P. roseus* Raillo.

INTRODUCTION

The various genera in the Gymnoascaceae have been clarified and broadened in recent papers, and several new genera and species have also been described. The genus *Pseudogymnoascus* Raillo has been treated (2,4,7,12,13, 24) several times since it was established by Raillo (21) in 1929. The taxonomy of this genus, however, remains in a rather confused state. The purpose of this communication is to clarify this genus and outline its taxonomy more precisely.

TAXONOMY AND DISCUSSION

Pseudogymnoascus Raillo, Zentralbl. Bakteriол. Parasitkde (Abth. 2) 78: 520. 1929.

Gymnothecia more or less globose, discrete or confluent, in yellow to orange or red to brown shades; peridium composed of a loose network of elements or anastomosing more or less at right angles, smooth or roughened, thick-walled, dark colored; appendages absent or simple, short, thin-walled, hyaline, echinulate or tuberculate; asci 8-spored, globose or ovoid, usually stalked, evanescent; ascospores ellipsoid to fusiform, smooth, hyaline, yellow or pink. Asexual state when present represented by aleuriospores and arthroaleuriospores.

Species typica: *Pseudogymnoascus vinaceus* Raillo

Raillo (21), in establishing the genus *Pseudogymnoascus*, did not designate a type species, but described *P. vinaceus*

first and *P. roseus* second. Clements and Shear (8), did not consider *Pseudogymnoascus*. Gilman (12) made no mention of a type, but did list *P. vinaceus* first as did Apinis (2) in his revision of the British Gymnoascaceae. Benjamin (4) did not mention a type in his discussion. Cejp and Milko (7), in their treatment of the genus and description of a new species (*P. caucasicus*), made no mention of a type but listed *P. vinaceus* first. Arx (3) noted the type as *P. roseus* Raitlo. Samson (24) also designated *P. roseus* as the type. Kuehn (13) designated *P. vinaceus* Raitlo as the type in 1959 in his survey of the Gymnoascaceae. This designation of a type (lectotype) is the earliest and must be accepted in accordance with Article 8 of the *International Code of Botanical Nomenclature*.

1. *Pseudogymnoascus vinaceus* Raitlo, Zentbl. Bakteriöl. Parasitkde (Abth. 2) 78:520. 1929.

= *Gymnoascus vinaceus* (Raitlo) Apinis, Mycol. Pap. 96:9. 1964.

= *Pseudogymnoascus bhattii* Samson, Acta Bot. Neerl. 21:519. 1972.

Gymnothecia discrete or confluent, usually globose, 75-300 μm diam, in yellow to orange shades; peridial hyphae net-like or loosely interwoven, dark-colored, smooth; distinct appendages absent; asci globose or ovoid, 5-6 x 4.5-6.5 μm , hyaline; ascospores ovoid to fusiform 2-3 x 3.5-5.7 μm , hyaline to yellow; asexual state absent. Illustrations: See Figures 1 and 2 and those of Samson (24).

Distribution: Canada, U.S.A. (Alaska) and U.S.S.R.

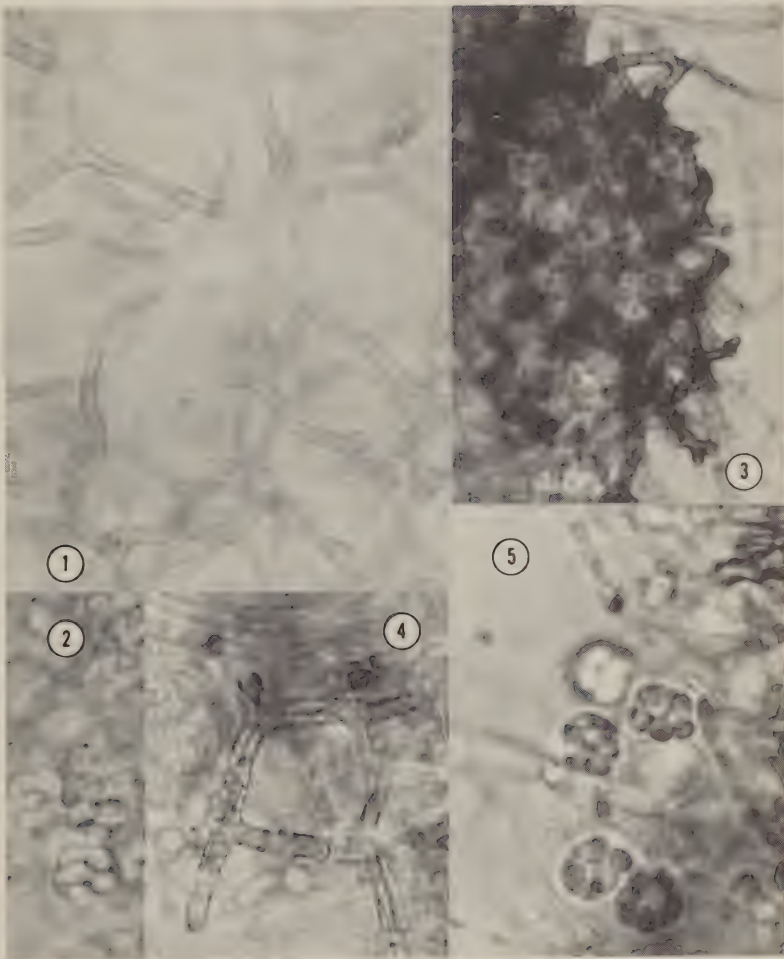
Material Examined:

0-1115 (Bissett JB 135, CBS 762.71), 0-1119 (Bissett JB 95, NRRL 6080, CBS 760.71, ATCC 28808), 0-1138 (Bhatt PET 34), 0-1143 (Bhatt PET 57), 0-1145 (Bhatt 375) from alpine soil, Mt. Allen, Kananaskis, Alberta, Canada. Dried disc cultures of representative strains have been deposited in NY, FH and CUP.

A dried disc culture of strain CBS 760.71 (originally designated as the type for *P. bhattii*) and deposited in NY is suggested as the neotype for *P. vinaceus* since it produces those characters most typical for the species among the strains available for comparison.

Colonies on Oatmeal-Salts agar (14) and Freezing agar (20) at first yellow, becoming orange and attaining a diameter of 20-25 cm in 18 to 20 days at room temperature (22-25°C). Reverse of colonies in red to red-brown shades. No exudate or odor observed.

Gymnothecia composed of a loosely woven net-work of



Figures 1 & 2. *Pseudogymnoascus vinaceus*. Figure 1. Peridial elements, x 1000. Figure 2. Asci and ascospores, x 1000. Figures 3-5. *Pseudogymnoascus roseus*. Figure 3. Gymnothecium, x 600. Figure 4. Peridial elements, x 1200. Figure 5. Asci and ascospores, x 1200.

hyphae in yellow to orange shades, often roughened with crystals. Distinct appendages absent. Hyphal terminations at periphery of the gymnothecia somewhat smaller in diameter with walls slightly thinner. Color and characteristics of the peridial elements as described by Ralston (21) for *P. vinaceus*, and reiterated by Gilman (12) and Kuehn (13).

Asci arising from croziers, usually stalked, subglobose, hyaline and early evanescent.

Ascospores ovoid to fusiform, yellow in mass, hyaline when viewed singly.

The measurements given here are slightly larger than those given by Ralston (21). This discrepancy may be accounted for by strain variation and by later, more sophisticated instrumentation. Ascospores of such shape have also been reported for species of *Myxotrichum* Kunze, *Byssosascus striatissporus* (Barron & Booth) von Arx, *Arachniotus candidus* Schroeter, and *A. terrestris* Ralston. Such a spore shape suggests a possible relationship among those taxa. Gymnothecia of these genera differ widely.

Species of *Gymnoascus* Baranetzky and *Pseudogymnoascus* are occasionally reported from soils and other substrates (1,5,6,22,23,30), but subcultures for confirmation or comparison are seldom available. Farrow (11) and Siddiqi (25) reported *P. vinaceus* from soils, but in view of the apparent confusion between *P. vinaceus* and *P. roseus* Ralston, it is likely that *P. roseus* was the fungus which was isolated. Apinis (2) listed *P. vinaceus* as being isolated from rabbit dung, but also stated that the isolates were near *G. reessii* Baranetzky. Not only do the gymnothecia of the two genera differ, but appendages typical of most species of *Gymnoascus* (17) are lacking in *Pseudogymnoascus*. In addition, ascospores of the former are discoid to oblate and those of the latter are ovoid to fusiform. Isolation data of *P. vinaceus* indicate it is mostly in forested and alpine soils. Isolations from other substrates have not been confirmed.

2. *Pseudogymnoascus roseus* Ralston, Zenthl. Bakteriöl. Parasitkde (Abth. 2) 78:250. 1929.

= *Gymnoascus roseus* (Ralston) Apinis, Mycol. Pap. 96:8. 1964.

= *Gymnoascus rhousiogongylinus* Wener & Cain, Canad. J. Bot. 48:325. 1970.

Imperfect state = *Geomyces vinaceus* Dal Vesco, Allionia 3:15. 1957.

Gymnothecia discrete or confluent, more or less spherical,

40-300 μm diam, at first white, finally red or brown; peridial hyphae consisting of a network of elements anastomosing at nearly right angles and often swollen at the junctures (internodes), usually in red to brown shades, thick-walled; appendages simple, short, up to 18 μm long, smooth or tuberculate, thin-walled; asci mostly subglobose, 5-10 μm diam, stalked, hyaline, evanescent; ascospores ovoid to fusiform, 3-4 x 1.5-2.5 μm , smooth, pink to red in mass, hyaline when viewed singly.

Imperfect state represented by arthroaleuriospores and aleuriospores, somewhat globose to ellipsoid, 2-4 x 1.5 - 2.5 μm , with a truncate base, hyaline. Illustrations: see Figures 3,4,5, and those of Samson (24). Distribution: Canada, England, Germany, India, Italy, Japan, Mozambique, Panama, U.S.A. and U.S.S.R.

Material examined:

Herbarium specimen: IMI 46432 (J.E. Brinde BSR 7, Nov. 1949) from soil, Ampthill Forest Nursery Beds, England labeled *Arachniotus candidus* (Eidam) Schroeter.

Cultures: Canada - 0-1117 (Bhatt IBP 264), grassland soil, Matador, Saskatchewan; 0-1142 (Bhatt PET 36), 0-1147 (Bhatt UW 607), 0-1144 (Bissett JB 653), 0-1116 (Bissett JB 147, CBS 691.71), 0-1118 (Bissett JB 97), 0-1146 (Bissett JB 339), 0-1114 (Widden α -70, CBS 387.69, ATCC 22474, UAMH 2879), alpine soil, Kananaskis, Alberta; 0-3595 (Wener TRTC 45536, CBS 722.69, ATCC 18970, UAMH 3337), labeled as type for *Gymnoascus rhousiogongylinus* Wener & Cain, forest soil, Ontario. 0-3729 (Malloch TRTC 45538, UAMH 3875), porcupine dung, Ontario; 0-3391 (MRI-A-1); 0-3390 (MRI B-1, 0-3653 (B238 1123) uncertain location, soil. England - 0-3151 (Apinis BDUN 266, NRRL 6377, CBS 396.65, IMI 114651) labeled as neotype for *Pseudogymnoascus roseus*, soil. Germany - 0-3092 (Domsch, CBS 605.70), 0-3205 (Gams C 400), 0-3588 (Gams MV 277), from soil. Italy - 0-671 (Dal Vesco T-1, CBS 319.62, UAMH 1644), labeled as type for *Geomyces vinaceus*, 0-3392 (Dal Vesco T-2, CBS 320.62), 0-3392 (Dal Vesco T-3), soil, Torino; 0-2513 (Ghillini 3J3, CBS 261.61), soil, Padua. Japan - 0-3630 (Udagawa NHL 2284, UAMH 2005), soil. U.S.A.: Arizona - 0-1184 (States NM 27), mountain soil. Colorado - 0-1338 (Christensen TC-57), 0-3697 (Durrell I-4), soil. Iowa - 0-516 (Taber T 87, PRL 1453), soil. Wisconsin - 0-3210 (Bachus RMF 612), 0-3357 (Christensen IKI B-239), 0-3358 (Christensen WSF B 2254), 0-3463 (Christensen RMF 606), 0-3654 (Christensen WSF 3875), 0-3389 (Orpurt, QM 6969, UAMH 1990), soil. Wyoming - 0-1339 (Christensen TC-60), 0-1325 (Rall, TC-218), 0-3468 (States 13c),

soil. Dried disc cultures of representative strains have been deposited in NY, FH and CUP.

Colonies on Oatmeal-Salts agar (4) and Freezing agar (20) rosaceous to purple shades (red-brown in strain 0-3630) attaining a diameter of 18-20 mm at room temperature (22-25° C) in 25 to 30 days. Reverse red to red-brown. No exudate or odor observed.

Asci arising from croziers, usually stalked, subglobose, hyaline and early evanescent.

Peridial hyphae forming the gymnothecia in red to red-brown shades, thick-walled and often swollen at the internodes. This latter condition is lacking in strains of *P. vinaceus*. Enlargements of this type are not common in species of Gymnoascaceae, but have been reported in *Gymnoascus intermedius* Orr (16) and in *Gymnoascoideus petalosporus* Orr, Ghosh & Roy (19).

The simple appendages forming at the apices of the hyphal elements in *P. roseus* are also lacking in *P. vinaceus*.

Ascospores of *P. roseus* are ovoid to fusiform, pink and similar to though slightly smaller than those of *P. vinaceus*. Ascospores of *P. vinaceus* are yellowish.

The asexual state of *P. roseus* was described by Dal Vesco (10) for *P. vinaceus* and this further attests to the confusion between the two species over the years. Sigler and Carmichael (26) have clearly demonstrated that the asexual state as described by Dal Vesco is actually that of *P. roseus*. Many strains of this species tend to lose their ability to produce the sexual state at room temperature and produce only *Geomyces vinaceus* colonies. Sigler and Carmichael (26) indicate that gymnothecial production is temperature dependent and that the sexual state is readily produced at 18° C.

Sigler and Carmichael (26) have also stated that *Geomyces pannorus* is morphologically similar to *G. vinaceus* and only production of the sexual state by the latter and its colonial coloration can it be distinguished. Possibly appropriate mating of strains of *G. pannorus* combined with reduced temperatures and nutrition might produce a gymnoascaceous state that is related to *Pseudogymnoascus*.

The synonymy as given by Samson (24) for *P. roseus* is in error. *P. vinaceus* is the type of the genus and *P. roseus* is a distinct species. The two species are readily distinguishable from one another.

Isolations of *P. roseus* are noted in the literature from time to time (9,11,22) and usually from alpine or forested soils. *Gymnoascus reessii* has been reported from such soils by Busby et al. (5), who noted that it was

purple-red. Since *G. reessii* strains are not known to exhibit that color, it is more likely that the isolate was *P. roseus*. Udagawa (29) also reported *G. reessii* from soil in Japan. An examination of that strain showed that it was also *P. roseus*. Apinis (2) reported *P. roseus* from snail eggs and other littoral debris. None of the cultures studied here were isolated from substrates other than soil. Possibly the strains examined by Apinis (2) actually represented *G. reessii*. Wener and Cain (30) described a new species of *Gymnoascus* (*G. rhousiogongylinis*), but examination of the type demonstrated that it is *P. roseus*. Other investigators (20,26) have expressed similar conclusions.

Neither *P. vinaceus* nor *P. roseus* have been isolated from human sources and therefore are not implicated pathologically as are other members of the Gymnoascaceae (15).

The misidentification of herbarium specimen (IMI 46432) as *Arachniotus candidus* by Apinis (2) further attests to the confusion in *Pseudogymnoascus*. This specimen was discussed in detail earlier (18).

3. *Pseudogymnoascus caucasicus* Cejp & Milko, Česká Mykol. 20:161. 1966.

= species of uncertain position.

No gymnothecia, initials or ascospores were produced by the type culture on the media utilized. The hyphae were quite reminiscent of those for the Phycmycetes. Samson (24) reported some stalked chlamydospore-like structures, but I did not observe them. I did not observe any of the spinal initials or stalked conidiophores and conidia reported by Cejp and Milko (7). It is possible they were examining a mixed culture, one of which was *P. vinaceus*.

Material examined: 0-1295 (CBS 373.67, NRRL 6079, ATCC 28808), labeled as the type for *Pseudogymnoascus caucasicus* Cejp and Milko, from forest soil, Lake Riza, Caucasus, U.S.S.R.

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MYCOTAXON

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A NEW SPECIES OF AMANITA

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While collecting near Highlands, North Carolina during the summer of 1975, my wife spotted a small *Amanita* growing out of a red clay road cut. Although it was recognized as a member of section *Lepidella*, I could not identify it any further. Subsequently, a comprehensive examination of the macroscopic and microscopic characters has led me to the conclusion that this specimen is representative of a heretofore unnamed species.

Amanita altifissura Jenkins, sp. nov.

Holotype: North Carolina - Highlands, 25. viii. 1975, Jeannie, Tiffan, and David T. Jenkins 991(DTJ).

Pileus 40 mm latus, convexus, penitus rimosus-aureolatus, margo non striatus; volva tenues crustati vel panni in quaque areola, fusci. Lamellae albae ad pallidi cremoris colorem. Stipes 20 x 8-11 mm, floccus ad apicem, glaber infra, albus; exannulatus; bulb ad fundum subnapiformatus; nulla reliqua volvarum in stiperis fundo. Sporae (5.0)5.5-6.2 x (9.4)10.2-11.7(12.5) μ m.

Fruit body small, solitary. PILEUS: 40 mm diam, plano-convex, white, margin not striate, dry, deeply rimose-areolate, margin incurved and slightly appendiculate, flesh white, 5 mm thick at center; volval remnants as thin, crusts or patches on top of each areola, relatively firmly attached, irregularly shaped, dark brown. LAMELLAE: not crowded, adnexed, narrow, white to pale cream, edges finely pruinose, occasional anastomosing between gills and lamellulae; lamellulae numerous, concavely to convexly truncate to subattenuate. STIPE: 20 x 8-11 mm tapering upward and slightly expanded at apex, solid, slightly floccose at apex, then glabrous below, white; exannulate, annulus possibly evanescent; basal bulb subnapiform, 33 x 18 mm, white, glabrous, spongy; no volval remnants remaining on basal bulb or base of stipe. No distinct smell, but with a slightly unpleasant taste.

PILEIPELLIS: filamentous hyphae 2-8 μ m diam, interwoven, only very slightly gelatinized, hyaline to slightly yellowish in alkaline solution. PILEUS TRAMA: filamentous hyphae moderately branched, up to 8 μ m diam; inflated cells elongate, terminal or short, terminal chains. LAMELLA TRAMA: bilateral; filamentous hyphae 3-9 μ m diam, moderately branched, clamped; inflated cells clavate to cylindrical, terminal or in short, terminal chains, up to 225 μ m long. SUBHYMENIUM: ramose, filamentous hyphae clamped, up to 9 μ m diam. BASIDIA: up to



Fig. 1. *Amanita altifissura* Jenkins DTJ 991

42-58.5 x 3.9-11.7 μm ; 4-sterigmate, clamped. VOLVA: on pileus a moderately dense tissue of irregularly disposed, terminal chains of inflated cells and single, terminal cells; cells variable in shape, i.e., globose, subglobose, broadly elliptic, ovoid, elliptic, and clavate, rarely over 50 x 50 μm ; filamentous hyphae moderately abundant, up to 8 μm diam, no clamps observed, sparsely to moderately branched, gloeoplerous hyphae present, but sparse. STIPE TRAMA: filamentous hyphae 2-9 μm diam, sparsely branched, abundantly clamped; inflated cells up to 21.9 x 312 μm , slenderly clavate, terminal, longitudinally oriented, frequently clamped.

SPORES: (5.0)5.5-6.2 x (9.4)10.2-11.7(12.5) μm ($E = 1.62$ -2.13; $E^m = 1.90$), elongate to short cylindric, adaxially flattened, thin walled, hyaline, spore print white, amyloid; contents guttulate to subgranular; apiculus sublateral, cylindric to slightly truncate-conic.

Habitat and distribution: terrestrial on red clay road cut near deciduous forest, Highlands, North Carolina.

Discussion: This taxon is very easily associated with section *Lepidella* and subsection *Solitariae* due to the presence of several characters: spores amyloid, pileus margin slightly appendiculate, pileus white, and volva composed of irregularly disposed, variform

elements. Within subsection *Solitariae*, however, establishing a relationship with other organisms was found to be difficult. Due to such characters as rather abundant volval hyphae, irregular disposition of volval elements, volval remnants on pileus as crusts or patches, and clamped basidia, the only stirps into which *Amanita altifissura* (Fig. 1) might fit is *Grossa* (Bas, 1969). Bas, however, states that because of the poor condition of types or lack of material for most of the organisms within this stirps, some of the taxa may be incorrectly included. This may account for the fact that *A. altifissura* does not appear to be closely related to the other taxa within this stirps.

ACKNOWLEDGEMENTS

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A NEW AMANITA FROM FLORIDA

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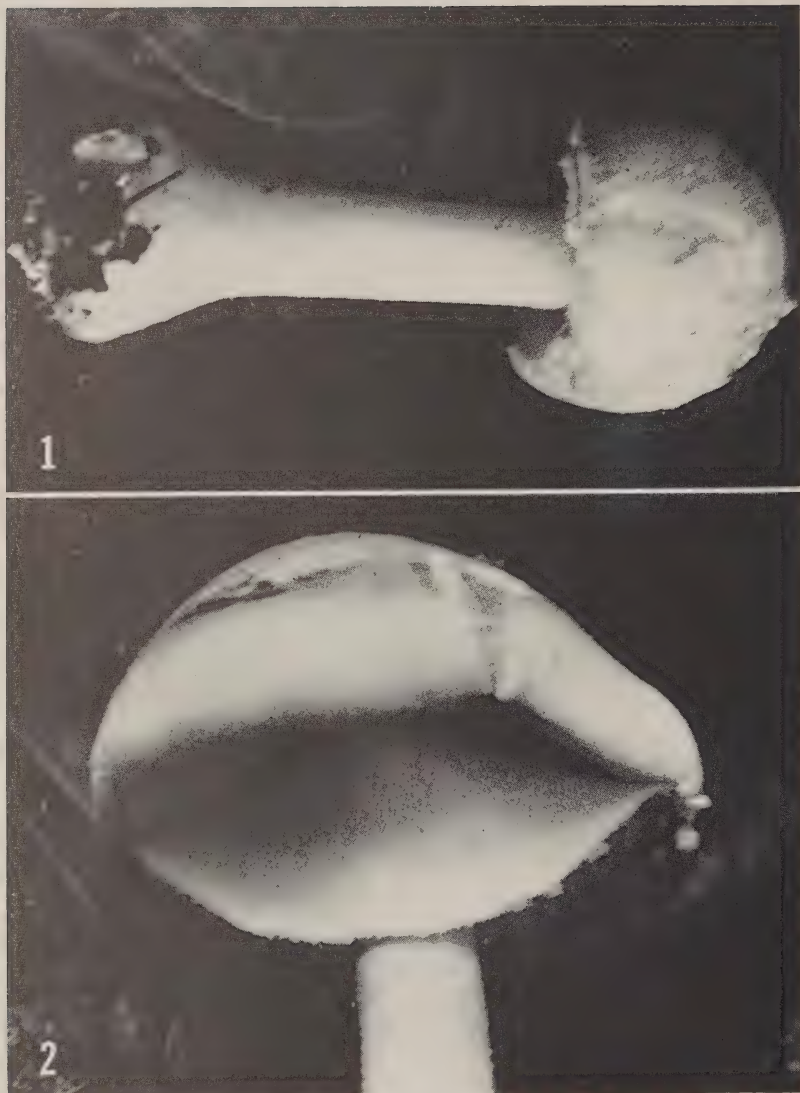
Amanita komarekensis (Figs. 1 & 2) represents an interesting and significant addition to the taxa within section *Amanita* in North America. Although only two collections have been made, fruitbodies are easily recognized as being quite different from others within this section. The most noticeable character of difference is the pinkish, pulverulent volva. Pigmented volvas of specimens of other taxa within section *Amanita* are either tan, gray-brown, or yellowish. The texture and disposition of this volva are quite like those of *Amanita wellsii*, but the nearly cylindric spores and the yellowish volva of *A. wellsii* (Jenkins, 1977) more than adequately separate it from *A. komarekensis*. There are several taxa in this section whose fruitbodies are whitish to creamy-white, e.g., *A. albocreata*, *A. crenulata*, *A. agglutinata*, *A. monticulosa*, *A. muscaria* var. *alba*, and *A. pantherina* var. *multisquamosa*. *Amanita komarekensis* can, however, be easily separated from any of the above based upon the combination of the pinkish-beige, pulverulent volva, the broadly elliptic to elliptic spores, a moderately striate pileus margin, pinkish pulverulence on the apex of the stipe, and a lack of ascending rings or adnate volva material on the stipe base.

Amanita komarekensis is easily recognized as a member of section *Amanita* due to the non-amyloid spores, the striate margin, and the bulbous stipe base. At the moment, however, there are no other known closely related taxa within this section in North America.

Amanita komarekensis Jenkins & Vinopal, sp. nov.

Holotype: Florida - Tall Timbers Research Station, 7. vii. 1977,
Joanne Vinopal 40833(TENN).

Pileus 30-65 mm latus, convexus, gilvus dein ravis, margine striatus, subvividus, glaber; volva roseo-ravus, pulverulentus vel pulverulento-coactatis. Lamellae albidus ad gilvus. Stipes 60-100 x 5-11 mm, cremae, apice roseo-pulverulente, glaber vel basi, volva roseo-ravus, pulverulentus vel coactatis; annulus apicalis, membranaceo roseo-ravus. Sporae 8.2-9.4(10.2) x 5.5-7.0(7.8) μ m, non-amyloideae.



Figs. 1 & 2. *Amanita komarekensis* 40833(TENN)

PILEUS: up to 65 mm broad, plano-convex to plane with slight umbo, margin moderately striate and slightly inrolled, creamy-white becoming more beige with age, slightly viscid, glabrous, flesh up to 5 mm thick at center; volval remnants as thin patches or as a thin, pulverulent layer covering most of pileus surface, pinkish-beige, easily removed. **LAMELLAE:** widely free, crowded, creamy-white, broadest near margin of pileus, edges pulverulent; lamellulae numerous, truncate. **STIPE:** 60-100 x 5-11 mm, tapering slightly upward, but expanded at apex, slightly stuffed to hollow, creamy-white with pale pinkish pulverulence near apex, becoming more glabrous toward base, basal bulb subglobose to ovoid, up to 25 x 20 mm, creamy-white; volva as pinkish-beige pulverulence, chunks, or patches, distributed irregularly on apex of bulb, never as ascending rings or adnate, free limb; annulus apical, very thin, membranous, pale pinkish-beige, striate above, more floccose below with pinkish-beige chunks of universal veil on margin, moderately persistent, frequently missing in age; no distinct smell or taste.

PILEIPELLIS: filamentous hyphae densely interwoven to subradial, slightly gelatinized, hyaline to slightly yellowish in alkaline solution. **PILEUS TRAMA:** filamentous hyphae undifferentiated, moderately branched, up to 9 μm diam; inflated cells elongate, terminal or short, terminal chains. **LAMELLA TRAMA:** bilateral; filamentous hyphae up to 8 μm diam, moderately branched, clampless; inflated cells oblong-elliptic to clavate, terminal or short, terminal chains. **SUBHYMENIUM:** hyphae ramose, clampless. **BASIDIA:** up to 51 x 4-10.2 μm , 4-sterigmate, thin walled, clampless. **VOLVA:** filamentous hyphae at base of stipe abundant, sparsely to moderately branched, up to 9 μm diam, clampless; inflated cells globose, subglobose, to broadly elliptic with fewer oblong-elliptic to elliptic, up to 40 x 40 μm , terminal or short, terminal chains, irregularly disposed: tissue on pileus with fewer and narrower filamentous hyphae; inflated cells more variable in shape than at base of stipe, globose, subglobose, broadly elliptic, elliptic, oblong-elliptic, pyriform, clavate, or astringo-cylindric, irregularly disposed, up to 78.3 x 47 μm . **STIPE TRAMA:** filamentous hyphae undifferentiated and abundant, sparsely branched, up to 8 μm diam, clampless; inflated cells terminal, clavate, longitudinally oriented, up to 300 x 47 μm , most being less than 200 μm in length. **PARTIAL VEIL:** filamentous hyphae dominant, moderately branched, 3-6 μm diam, clampless, irregularly interwoven; inflated cells abundant, terminal, globose, up to 35 μm diam.

SPORES: 8.2-9.4(10.2) x 5.5-7.0(7.8) μm (E - 1.22-1.56; E^m - 1.38), broadly elliptic to elliptic, often adaxially flattened, hyaline, non-amyloid, thin walled; contents guttulate; apiculus sublateral, cylindric.

Habitat and distribution: terrestrial, in annually burned, mixed coniferous and deciduous forest, (*Pinus taeda*, *Liquidambar styraciflua*, *Cornus florida*, *Quercus virginiana* dominant), Tall Timbers Research Station, northern Florida.

Collections examined: Florida - Tall Timbers Research Station, 7. vii. 1977, Joanne Vinopal 40833(TENN); Tall Timbers Research Station, 14. vii. 1977, Joanne Vinopal 1049(JV).

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ANAMORPH & TELEOMORPH: TERMS FOR ORGANS OF REPRODUCTION

RATHER THAN KARYOLOGICAL PHASES

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The term *t e l e o m o r p h* was introduced (Hennebert & Weresub 1977) to refer to the "form....that is involved in producing meiotic diaspores....: ...an ascocarp or its equivalent...etc.", and the term *a n a m o r p h* revived for "the asexual, mitotic diasporic expression of a fungus". Our purpose in presenting these terms was to further the discussions on Art. 59 of the International Code of Botanical Nomenclature (Stafleu et al. 1972) by providing a concise (and, we hoped, unequivocal) way of referring to the elements that are specified as essential for typifying the names, respectively, of the botanical and anatomical systems of nomenclature regulated by that Article. "Teleomorph" was coined primarily to abbreviate the phrase ("the form which it has been agreed to call the perfect form") that had been used in all versions of the rule prior to the Stockholm Code. No change in meaning was intended, it being assumed that mycologists had, by this time, arrived at a consensus on what was meant by "an ascocarp or its equivalent, at maturity producing asci and ascospores;...a basidiocarp or its equivalent, at maturity

producing basidia and basidiospores ..." But apparently our assumption was unwarranted. Petersen (1978: 505) has given primacy to the karyological (meiotic/mitotic) distinctions made in the definitions of the terms teleomorph and anamorph, to the point where he suggests that basidiocarps (lacking clamps and therefore, perhaps) in whose basidia meiosis does not take place "are really anamorphic (i.e. do not exhibit a perfect state)".

Petersen's approach is more or less the reverse of Arthur's (1934) karyological interpretation of the terms "imperfect state" and "perfect state". He sought to define the "perfect state" by the presence of a dikaryon in the hyphae, and thus, along with Bisby (1944), to include uredinial forms with telial forms as "perfect". Rogers (1948) demonstrated the unfeasibility of applying the terms in this way. In his rebuttal of Arthur's argument, Rogers wrote that "the 'states' referred to by the Rules are not cytological phases, but organs of fructification (or assimilation)". Therein lies one of the strong reasons for converting from the "state" terms to "anamorph" and "teleomorph", because these are explicitly morphological.

The teleomorph is a morph, a form, an organ or series of organs known to be, in most fungi, specialized as the site of the fusion of gametic nuclei and the immediate or eventual production of meiospores: in "phycomycetes" -- typically the oospore, zygospor, and resting spore, germinating directly into a haploid thallus or producing either motile or non-motile diaspores; in ascomycetes -- the ascocarp (ascoma) with asci and ascospores; and in basidiomycetes -- the basidiocarp (basidioma) with basidia and basidiospores. Teleomorphs assume many shapes and are constructed in many ways; but few are formed in such a way that they cannot now be distinguished from anamorphs such as conidiomata producing conidia, or other asexual morphs producing somatic diaspores.

Let us take basidiocarps, for instance. The typical basidiocarp demonstrates a clamp connection at each septum of its dikaryotic hyphae, fusion of nuclei within the pro-basidium, meiosis during the maturation of the basidium, entry of a single haploid nucleus into each developing basidiospore, and finally forcible discharge of the four meiospores. But variations occur (see also Donk 1973). Hyphae may be multinucleate or uninucleate, individual nuclei haploid or diploid (Peabody et al. 1978); clamp

connections may be sparse, or verticillate, or lacking entirely; and yet the "sexual" karyological process may proceed normally, as in, for example, *Thanatephorus praticola* (Saksena 1961) or the *in vitro* haploid fruiting of "*Peniophora*" *ludoviciana* (Biggs 1938). In some natural parthenogenetic fungi (see e.g. Smith 1934, Lamoure 1969), basidia receive only a single nucleus; it divides in some fungi only once, in others twice (sometimes meiotically?), perhaps thrice, to produce nuclei for two, three or four spores. Secondarily homothallic fungi (Ginns 1974) produce spores that contain two nuclei of compatible mating type. In Gasteromycetes, in some parasitic Hymenomycetes (Ginns & Sunhede 1978) and perhaps other basidiomycetes, the basidiospores are not ballistic. And in the Teliomycetes, a sorus of teliospores in which fusion of nuclei may not yet have occurred, perhaps may never occur, is taken to be satisfactory evidence of sexuality. No matter what their differences, all these forms have been traditionally accepted as "sexual", "perfect" forms.

This means that, although we view sexual reproduction in the fungi as essentially a three-stage process composed of plasmogamy, karyogamy and meiosis (Burnett 1975:8), the organs and cells within which these phenomena occur under normal conditions are accepted as sexual even when impairment of the process (Burnett 1975: 170) takes place. As long as organs that are specialized for sexuality are involved, whether all or none of the cytological sexual events occur, the reproductive phase is understood to be teleomorphic.

A separate problem arises in the case of fungi that produce diaspores following meiosis in cells that do not conform in structure to the familiar so-called sexual cells, or are not borne within recognizable ascocarps or basidiocarps. Many yeasts are protosexual, at some time in their life-cycle changing from a haploid to a diploid condition, their diploid nucleus eventually undergoing meiosis, with a return to cells that are haploid. Where the form of the cells reveals no characteristic difference between these different parts of the life-cycle, karyological evidence is the only means for distinguishing teleomorph from anamorph. Karyology is also decisive in the case of organisms such as *Digitatispora marina* Doguet (1962), so completely adapted to its marine environment that its basidia and basidiospores are morphologically indistinguishable from aquatic conidiophores and conidia.

In these fungi, where a distinctive form is lacking, we must emphasize the karyological process: the entry of two haploid nuclei into a cell with establishment of either a dikaryon or a diploid condition must be taken as the initiation of the teleomorphic phase (with a possibility of anamorphic replication superimposed), and the return to diasporic haploidy by means of meiosis must be accepted as the teleomorphic finale, the span of these events constituting the teleomorphic phase. The Uredinales present still another deviation in their endocyclic species (Laundon 1967), wherein aecia (otherwise anamorphic) demonstrate fusion of nuclei and meiosis with the production of basidia and basidiospores, and must be recognized as teleomorphic. The term "teleomorph" must be defined in such a way as to include cases of these kinds as well, wherein karyology is decisive.

Thus, meiosis must, in a few cases, be taken as the sole criterion for identifying a form as teleomorphic. In other cases, however, this karyological event may not be primary, not only because meiosis does not necessarily occur in all fungi with clearly recognizable ascomata and basidiomata, but also because the occurrence of parasexuality might introduce a further ambivalence into the interpretation of teleomorphy. In the majority of fungi, therefore, the teleomorph must continue to be recognized more by its form than by the karyological events within it, lest Art. 59 be accused of requiring that the parthenogenetic sibling of a normally sexual fungus be denied a congeneric name in a holomorphic genus, or an obviously anamorphic fungus with occasional bouts of parasexuality be vaulted into a genus unavailable to its fellow (non-parasexual) anamorphs. This kind of additional illogicality would undoubtedly cause abandonment of Art. 59, with its imposition of two nomenclatural systems on non-lichenized pleomorphic ascomycetous and basidiomycetous fungi. For some mycologists, abandoning Art. 59 may perhaps be an attractive outcome, but it is a step that, if taken, should result from deliberate intent rather than terminological confusion. As long as the two nomenclatural systems continue in force and are distinguished by means of the typification and application of their names, terms that distinguish between the nomenclatural types can be helpful. They must not be allowed to contribute to the problems of Art. 59. The term "teleomorph" was coined, not to confuse our understanding of what constitutes a sexual form, but in order to give terminological specification to the form

required by Art. 59 to typify a holomorphic name.

We cannot, of course, prevent misinterpretations. We can only stress that the terms teleomorph and anamorph apply (without exclusion by variations in karyology, though with the use of karyological evidence where necessary) to what has traditionally been accepted as the forms "which it has been agreed to call" the "perfect" and "imperfect" forms respectively. Whether amplifying our original definitions can forestall further misinterpretation we do not know, but we make the attempt here, as follows:

Teleomorph: a reproductive organ morphologically and /or karyologically specialized for generating meiospores or their homologues, whether by normally sexual or parthenogenetic means. As directly applicable to Art. 59, the teleomorphic phase is characterized, in the Ascomycetes, by the production of an ascus or its homologue, maturing by development of asci/ascospores or their homologues; and in the Basidiomycetes, by the production of a basidioma or its homologue, maturing by development of basidia/basidiospores or their homologues.

Anamorph: an organ of asexual or somatic reproduction, either specialized or generalized, but neither morphologically nor karyologically teleomorphic.

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TYPE STUDIES IN THE GENUS PEZIZA. V. SPECIES DESCRIBED BY REHM

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Under the generic names *Peziza* [Dill.] L. ex St-Amans, *Plicaria* Fuckel, and *Pustularia* Fuckel, Rehm described a number of species of *Peziza sensu stricto*. The following is an account of the reexamination of these species. Rehm frequently used the name *Plicaria* for ellipsoid-spored species. Korf (1960) discussed this nomenclatural problem and determined that if *Plicaria* is to be used at all it should be restricted to the spherical-spored species.

I am indebted to Dr. Rolf Santesson, Director of the Section for Botany, Swedish Museum of Natural History, Stockholm, for allowing me to study Rehm's collections. Both Drs. Richard P. Korf and Harold H. Larsen, Jr. have again been very helpful.

Plicaria baeomycoides Rehm, Hedwigia 39: 96. 1900.

≡ *Peziza baeomycoides* (Rehm) Sacc. & Syd., Syll. fung. 16: 706. 1902.
Ad terram. Brasilia. Ule no. 498. S.

Plicaria baeomycoides and *P. baeomycoides* var. *albo-pruinosa* Rehm, described in the same publication, are both lichens and are referable to the genus *Baeomyces*. Rehm indicated in his description that the material gave the impression of a lichen with a granular thallus; he could not find algal cells. The apothecia are pinkish and sessile.

Plicaria bananincola Rehm, Leaflet. Philipp. Bot. 6: 2234. 1914.

≡ *Peziza bananincola* (Rehm) Sacc., Syll. Fung. 24: 1160. 1926-28.

Ad bananam emortuam, Luzón, Prov. Laguna, Los Baños, 7/1913, leg.
M. B. Raimundo, comm. C. F. Baker. S.

This is yet another of the smooth-spores species of *Peziza*. Using Svrček's (1970) treatment of this group, one would probably identify this as *P. crassipes* Quéf. *Peziza bananincola* differs, however, in that there are pustules on the outer surface of the apothecia and that the apothecia are situated upon an extensive subiculum composed of wide hyphae, up to 16 µm in diam. The apothecia are dark brown when dried, large, up to 5 cm, and have a very short stalk. Rehm reported the ascospores to be 18 - 20 x 9 µm, but my measurements are 20 - 23 x 10 - 11 µm. The walls of the ascospores are up to 2 µm thick.

The species is tentatively accepted and should be known as *Peziza bananincola* (Rehm) Sacc. Rehm compared *P. bananincola* and *P. palmicola* Berk. & Curt. He concluded that they differed in ascospore form.

Plicaria caeruleo-maculata Rehm, Ann. Mycol. 2: 351. 1904.

≡ *Peziza caeruleo-maculata* (Rehm) Sacc., Syll. fung. 18: 19. 1906.
Ad terram. East Madison, Wisconsin, comm. Dr. Harper, 1903. S.

The following is a translation of Rehm's Latin description:

"Apothecia at first globose, sessile with a short base, disc suborbicular expanded, margin distinct, pale, excipulum smooth, parenchymatic, of slightly ash-colored cells, 25 - 30 µ broad, context, dark, blue spotted, ridged when dry, 3 cm diam. Hypothecium especially blue tinted.

Asci cylindrical, apex rounded, 180 - 200 x 10 - 12 μ , 8-spored, apex colored blue in iodine. Spores ellipsoid, rounded at the ends, epispore asperulate, 15 - 18 x 9 - 10 μ , monostichous. Paraphyses filiform, septate. 3 μ broad, hyaline, at the apex up to 5 μ broad."

Harper's note with the holotype reads "Apothecia blue stained. Hyemenium pale stained. Flesh blue especially subhymenial layer."

To the description I can add the following comments: The excipulum is two-layered. The outer layer is composed of globose cells which range up to 20 μ m in diam. These are interspersed with broad hyphae 10 μ m in diam. This outer layer is about 100 μ m thick. Loose hyphal tips give this outer surface a furfuraceous appearance. The medullary excipulum is composed of large globose cells, 60 - 80 μ m in diam, with interspersed hyphae. The ascospores are biguttulate, 16 - 18 x 7 - 9 μ m and are warted. The warts occasionally anastomose. According to my measurements the paraphyses are as wide as 8 μ m, making them broader than Rehm reported. The apices are scarcely swollen.

Peziza caeruleo-maculata is strikingly similar in apothecial construction and ascospore morphology to *Peziza badio-confusa* Korf. There is sufficient disagreement between these two *Pezizas* to advise not merging them. From fresh material the question must be resolved as to whether the apothecia of *P. caeruleo-maculata* are blue or whether they become stained blue when bruised. *Peziza badio-confusa* is sometimes bluish-purplish but the species is variable in hymenial color. Like so many other *Pezizas*, *P. caeruleo-maculata* is probably a distinct species which requires only recollection to establish its true identity.

Plicaria chlorophaea Rehm, Hedwigia 20: 34. 1881.

≡ *Peziza chlorophaea* (Rehm) Sacc., Syll. fung. 8: 93. 1889.

≡ *Galactinia chlorophaea* (Rehm) Boud., Hist. Class. Discom. d'Eur. p. 48. 1907.

Auf Lohe eines Treibhauses im Universitäts garten zu Berlin, Prof. Magnus. Ascomyceten 553. FH.

This small, greenish species was described on tanbark in a hothouse. The ascospores are 14 - 16 x 8 - 9 μ m, ellipsoid, biguttulate, and marked with a fine, low, complete though somewhat irregular, reticulum. The asci become diffusely blue for their entire length in Melzer's reagent. Details of the apothecial anatomy cannot be seen from the poorly preserved specimens studied.

The green color of the apothecium and reticulate ascospores should make it possible to rediscover this species. Since it was found fruiting in a hothouse it is not known whether this is a temperate or tropical species.

Plicaria fuckelii Rehm, Hedwigia 24: 9. 1884.

≡ *Peziza fuckelii* (Rehm) Sacc., Syll. fung. 8: 85. 1889.

≡ *Galactinia fuckelii* (Rehm) Boud., Hist. Class. Discom. d'Eur. p. 48. 1907.

Auf Nagelfluh-Lehm bei Oberstaufen im Algäu, Britzelmayr. Im September. Ascomyceten 753a, FH.

Maas Geesteranus (1969) has designated Rehm Ascomyceten no 753a as lectotype and has provided a description of this species. He recognized the species on the basis of the following three features: 1.) the ascospore ornamentation consisting of "smaller and larger warts, which gradually unite to form low tortuous ridges," 2.) the short, inconspicuous excipular hairs, 3.) the occurrence of the species on loamy sand in mixed *Picea* and deciduous forests.

To date I have seen no material from North America which could be referred to this species.

Plicaria furfuracea Rehm, Hedwigia 20: 34. 1881.

≡ *Discina furfuracea* (Rehm) Sacc., Syll. fung. 8: 102. 1889.

≡ *Galactinia furfuracea* (Rehm) Boud., Hist. Class. Discom. d'Eur. p. 47. 1907.

In cinere horti. Augusta Vindellicorum. Ascomyceten 554. S.

A specimen from Rehm's Ascomyceten (no. 554) from Stockholm is here designated the lectotype of *Plicaria furfuracea* Rehm. This large collection, unlike that portion of the number in FH, is fully mature. My studies of this specimen show that *P. furfuracea* is a distinct species; but, the epithet *furfuracea* is preoccupied in *Peziza* and thus a new name is necessary:

Peziza cinatica Pfister, nom. nov.

≡ *Plicaria furfuracea* Rehm, Hedwigia 20: 34. 1881.

[≡ *Peziza furfuracea* (Rehm) Smits'ka, Ukr. bot zh. 29: 751. 1972, non *Peziza furfuracea* Roth ex Persoon]

Apothecia 5 - 15 mm broad when dried, mature apothecia reflexed without stipe, flesh thin. Hymenium yellowish (according to Rehm's original description). Outer surface of the apothecium white and scurfy. Asci cylindrical 200 - 250 x 9 - 10 μ m, tapering somewhat toward the base, with definite croziers, with a J+ apical ring. Ascospores biguttulate, small, 11 - 12.6 x 6 - 7 μ m, marked with low isolated warts. Paraphyses colorless, spatulate, 3 - 4 μ m broad, barely expanded at the apex.

Habitat: on ashes.

Peziza cinatica is similar to *P. tenacella* Phill. in Cooke and *P. praetervisa* Bres. All three occur on burned areas and have similarly sized ascospores. Rifai (1968) distinguished the two on differences in the form of their paraphyses and in the size of the warts on the spores. Both of these species, however, have violet hymenial and excipular pigments and the paraphyses of both are either curved or nearly hooked and are filled with dark granules. *Peziza cinatica* has neither these modified paraphyses nor does it have violet pigments. Given below is a table comparing these three closely related species.

	<i>P. tenacella</i> (Rifai, 1968)	<i>P. praetervisa</i> (Dennis, 1968)	<i>P. cinatica</i>
Apothecial size	10 - 30 mm	up to 30 mm	5 - 15 mm
Hymenial color	brownish purple to umber	violet with brownish tints	yellow
Outer surface	Purplish white minutely scurfy	pale violaceous, minutely scurfy	scurfy
Asci	185 - 220 x 7 - 8.5 μ m	250 x 10 μ m	200 - 225 x 9 - 10 μ m
Ascospores	10.5 - 12 x 5.4 - 6.5 μ m minutely warted	11 - 13 x 6 - 8 μ m warted	11 - 12.6 x 6 - 7 μ m warted
Paraphyses	1.8 - 2.5 μ m below, apex clavate, curved or hooked, 3.6-6 μ m above with colored granular contents	slightly clavate and curved at the tip, filled with purplish granules	3 - 4 μ m, straight, colorless without granular contents

Pustularia gigantea Rehm, Ann. Mycol. 3: 517. 1905.

≡ *Peziza gigantea* (Rehm) Sacc. & Trott., Syll. fung. 22: 611. 1913.

≡ *Sarcosphaera gigantea* (Rehm) Kanouse, Mycologia 33: 466. 1941.

Ad terram. Mackinac Island, Michigan, Juli 1899. Leg. Harper. S.

The type collection was sent to Rehm by E. T. Harper from Mackinac Island, Michigan. Harper (1918) subsequently reported on additional collections of the species from Michigan and published photographs. He compared it with *Sarcosphaera* and maintained that it differed from *S. coronaria* (Cooke) Boud. (now properly called *S. crassa* (Santi ex Steudel) Pouzar) by its smaller ascospores. I have reexamined Harper's material, and a collection I made in upper Michigan and, agreeing with Kanouse, find that they consistently have smaller ascospores than are generally reported for *S. crassa*. However, in reviewing the Farlow Herbarium collections of *S. crassa*, it was found that the spore size was variable. Buschmann's (1958) suggestion to synonymize *Pustularia gigantea* with *Sarcosphaera dargelastii* Nannf. in Lund. & Nannf. (= *S. crassa*) is confirmed.

A comment on the genus *Sarcosphaera* may be in order at this point. The genus was erected by Auerswald in 1869 for a single species, *Peziza macrocalyx* Reiss. The proper name of this species has been debated over the ensuing years. It has most commonly been called *Sarcosphaera macrocalyx* (Reiss) Auersw., *S. coronaria* (Cooke) Boud., *S. amplissima* (Fr.) Kanouse, and *S. dargelastii*. These changes of name have been discussed by Buschmann (1958) who also gave a description of the species. More recently Pouzar (1972) found yet another older available epithet, *Peziza crassa* Santi ex Steudel, which he combined in *Sarcosphaera*. Trappe (1975) pointed out that *Caulocarpa* Gilk., a monotypic genus for *C. montana* Gilk., should also be added to the synonymy.

Eckblad (1968) did not recognize *Sarcosphaera* as a distinct genus. Instead, he treated the species in *Peziza*. On morphological grounds there is some merit to this merger, however, in my unpublished studies I have found that *S. crassa* differs from most *Peziza* species in that there is an outer excipular layer of parallel hyphae which run perpendicular to the surface of the apothecium. Also *Sarcosphaera* seems morphologically quite close to certain of the Tuberales. On these bases I maintain *Sarcosphaera* as a distinct genus.

Plicaria mirabilis Rehm in Strass., Verh. K. K. Zool.-Bot. Ges. Wein 60: 476. 1910.

≡ *Peziza mirabilis* (Rehm) Sacc., & Trott., Syll. fung. 22: 612. 1913.

Auf Brandstellen am Sonntagberg. April 1910, no specimen examined.

The name is invalid since it was proposed as a *nomen ad interim*.

Plicaria repandoides Rehm, Ann. Mycol. 5: 518. 1905.

≡ *Peziza repandoides* (Rehm) Sacc. & Trott., Syll. fung. 22: 614. 1913.

Ad lignum putridum Populi. Port Byron, Illinois, U. St. Am. 5/1904, leg. Harper. S.

Seaver (1928) thought this was but a small specimen of *Peziza repanda*, a species to which Rehm had referred in his original description. The smooth, eguttulate ascospores are 14 - 16 x 8 - 9 μ m. The excipulum is composed of large globose cells with some intermixed hyphae. There is a middle zone of interwoven hyphae which gives the flesh a stratified appearance. The outer surface is pustulate, the pustules being composed of interwoven hyphae, 5 - 8 μ m in diam. Harper, on the specimen label, reported the apothecia to be watery-brown in color and Rehm described the species as sub-stipitate.

The species fits the description of *Peziza micropus* Pers. ex Pers.

given by Svřcek (1970) and should be considered a synonym of that species *sensu* Svřcek.

Plicaria rubro-fusca Rehm, Ann. Mycol. 3: 577. 1905.

≡ *Peziza rubro-fusca* (Rehm) Sacc. & Trott., Syll. fung. 22: 613. 1913.

Ad terram. Isle Royale, Michgian, U. St. Am. 7/1904, leg. Harper S.

Seaver (1928) placed this species in the synonymy of *Peziza abietina* Pers. ex Fr. (= *Pseudotis abietina* (Pers. ex Fr.) Boud.). The asci are J+.

The fungus reportedly occurred on soil, but, there are pieces of charred wood mixed in the soil suggesting that it was fruiting on a burned area. Harper noted that the fungus was, "Pallid to reddish brown both sides. Watery, cups from 2 - 4 cm in diameter." The material agrees with *Peziza atropora* Fuckel (≡ *Galactinia tosta* Boud., ≡ *Plicaria ferruginea* Fuckel). This species was discussed by Maas Geesteranus (1969).

Geoscypha subcupularis Rehm ex Rehm, Hedwigia 26: 82. 1887.

[≡ *Peziza subcupularis* Rehm, Ascomyceten no. 852. 1886. nom. nud.]

≡ *Peziza subcupularis* (Rehm ex Rehm) Sacc., Syll. fung. 8: 77. 1889.

In terra arenacea prope Berolinum, leg. Sydow. Ascomyceten 852. FH.

The specimen issued under the name *Peziza subcupularis* in 1886, is *Otospora leucoloma* Hedw. ex S. F. Gray.

Pustularia violaceonigra Rehm, Hedwigia 21: 98. 1882

≡ *Humaria violaceonigra* (Rehm) Sacc., Syll. fung. 8: 150. 1889.

≡ *Plicaria violaceonigra* (Rehm) Rehm in Rabenh. Kryptog.-Fl. 1(3): 1007. 1894.

≡ *Galactinia violaceonigra* (Rehm) Boud., Hist. Class. Discom. d'Eur. p. 47. 1907.

≡ *Peziza violaceonigra* (Rehm) Smits'ka, Ukrajins'k Bot. Žurn. 29: 751. 1972.

≡ *Pachyella violaceonigra* (Rehm) Pfister, Canad. J. Bot. 51: 2021. 1973.

Auf faulen Holz und der daneben befindlichen Erde, Alpen bei Parthenkirchen, bei München. IX. 1874. Arnold. S.

Pfister (1973) pointed out that this is a species of *Pachyella* and is synonymous with *P. barleana* Boud., type species of the genus *Pachyella*.

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A NEW SPECIES OF *STIGMINA*

ON *BEAUCARNEA* (LILIACEAE)

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Beaucarnea recurvata Lem. (elephant's foot or pony-tail plant) Fig. 1, a member of the Liliaceae, is collected from the wild in Mexico for the house and garden plants trade in the United States. Early in 1977, Plant Quarantine Inspectors Van Valkenburg, Burgess and Wood began finding evidence of a disease caused by an unnamed fungus on the foliage. This fungus, which has now been collected several times, is here described as *Stigmina beaucarneae* Pollack & D. Farr.

STIGMINA BEAUCARNEAE Pollack & D. Farr sp. nov. Figs. 2-16

Maculae elongato-ellipticae, pallide brunneolae, brunneo usque rufobrunneo marginatae, distinctae, usque ad 8 cm longae; sporodochia amphigena vel saepius hypophylla, pulvinata confluentia, brunnea vel atra; stromata immersa pseudoparenchymatica fusca vel atra; conidiophora e stratis superioribus stromatis orientia erecta parallela, dense

compacta, e cellulis usque ad 11 cylindricis 4-8 X 4 μ m in columna dispositis, brunnea; cellulae conidiogenae ad apicem conidiophorum terminales; holoblasticae proliferantibus percurrentibus praeditae, subglobosae dein cylindricae, pallide brunneolae, 6-26 x 4-8 μ m; conidia; singulatim ex apicibus cellularum conidiogenarum formantia, recta vel subcurvata, irregulariter cylindrica, subhyalina usque pallide brunneola, 0-7-euseptata, ad basim truncata, 30-74 X 4-7 μ m.

Hab. in foliis vivis *Beaucarnea recurvata* Lem. (Liliaceae), Mexico. Holotypus BPI 71905, Brownsville, Texas, No. 007449, June 2, 1977.

Leaf spots long elliptical, up to 8 cm long and 6 mm wide, pale brown with a brown or reddish brown border, centers becoming straw-colored. *Mycelium* immersed. *Sporodochia* formed in the center of the lesions, more frequently hypophyllous but can be amphigenous or epiphyllous, vein limited, initially circular to elliptical but often coalescing to form elongated striae up to 5 mm long, erumpent, lifting the epidermis and cuticle to form flap-like openings. *Stromata* immersed, consisting of a basal prosenchymatous stratum of interwoven brown hyphae, surmounted by a saucer-shaped base of pseudo-parenchyma consisting of thick walled, very dark brown cells. *Conidiophores* closely packed, parallel, simple or branched erect columns of more or less uniform width composed of up to 11 cylindrical cells 4-8 μ m long x 4 μ m wide, dark brown near base, pale brown at apex, with the conidiogenous cells at their distal end. *Conidiogenous cells* more or less swollen, holoblastic, ampulliform to subglobose to elongate cylindrical, proliferating percurrently with several inconspicuous annellations, aseptate, subhyaline to pale brown, smooth or roughened by wall fragments left after percurrent growth, 6-26 x 4-8 μ m. *Conidia* formed singly from the apex of the conidiogenous cells, subcylindrical, at times considerably narrowed at the base and wider in the lower half, apex round, base truncate with a marginal frill sometimes present, straight or slightly curved, 0-7-euseptate, subhyaline to pale brown, smooth or occasionally roughened, guttulate, 30-74 x 4-7.8 μ m.

On living leaves of *Beaucarnea recurvata* Lem. (Liliaceae), Mexico. Specimens examined: Brownsville, Texas No. 007449, intercepted by J. Van Valkenburgh,

Mexico, June 22, 1977 (BPI 71905), HOLOTYPE; Brownsville, Texas, Nos. 006926, 007441, 007442, 007557, collected February 7, June 21, June 20, July 5, all in 1977, and Brownsville, Texas 008348 and 008376 coll. May 15 and May 31, 1978.

This organism has been placed in the hyphomycetous genus *Stigmina* Sacc. because it possesses the characteristics used by Ellis (1971, 1975), Hughes (1952), and Sutton (1964, 1975) in their analysis and circumscription of the genus:

Sporodochia--punctiform, brown to black, confluent.
Stromata--always present, variable in size.

Conidiophores--packed closely together to form a pulvinate mass, brown, smooth or verrucose.

Conidiogenous cells--holoblastic, percurrent, cylindrical.

Conidia--solitary, cylindrical, rounded at the apex, truncate at the base, subhyaline to brown, smooth or roughened, with one or more transverse septa.

On the basis of its morphology and the opinion of Ellis (1975) that many *Stigmina* species are host specific, it is described as a new species. It shares with *S. ulei* (Syd.) Sutton (Morgan-Jones, 1971) the very dark saucer-like basal stromatic layer, but that species has superficial stromata and the conidia are smaller. It resembles *S. crotonicola* M. B. Ellis (1975) in that the conidiophores consist of long columns of cells, but that species has much larger and darker conidia. It most closely resembles *S. concentrica* (Cke. & Ellis) Deighton (1973), the only other species in the genus occurring on a member of the Liliaceae. In contrast to *S. beaucarnea*, *S. concentrica* has paler, more slender conidia 21-68 x 3-5 μm and smaller, 2.5-5 μm wide more loosely arranged conidiogenous cells. The leaf spots caused by *S. concentrica* have raised margins and the sporodochia are more erumpent and usually in concentric rings. Leaf spots with *S. beaucarnea* infection have margins that are neither raised nor sunken and the sporodochia are in a linear pattern.

Sporodochia of *Stigmina beaucarnea* have been examined in sectioned host material. The host, *Beaucarnea recurvata* (Fig. 1), has a thick cuticle which provides a barrier that is not readily penetrable and infection appears to take place only through the stomatal openings, giving rise to a small cluster of cells in the mesophyll

beneath the guard cells (Fig. 8). Hyphal growth then continues laterally into neighboring epidermal cells as well as vertically into the host mesophyll forming a submerged stroma between the cuticle and the mesophyll (Fig. 9). Guard cells or epidermal cells are penetrated or surrounded by the developing hyphae and incorporated into the stroma (Fig. 9). Stromata vary in the degree of host penetration as shown in Figs. 11-13. The upper layers of the stromata produce conidiophores which are initially subhyaline to pale brown, thin-walled cells arranged in columns whose growth forces the cuticle to bulge and rupture along one edge (Figs. 10, 11, 12). This one-sided breaking of the cuticle over the developing sporodochium gives the flap-covered sporodochium a distinctive macroscopic appearance (Fig. 2).

Conidiogenesis is not initiated until after the rupture of the cuticle. Conidia tend to adhere to each other in small groups. After the onset of conidiogenesis, the conidiophores continue to mature with the walls becoming thicker and more pigmented. A comparison of Fig. 13 with Fig. 3 shows this change. This increased pigmentation also occurs in the stromata. At maturity sporodochia protrude as pulvinate masses above the leaf surface.

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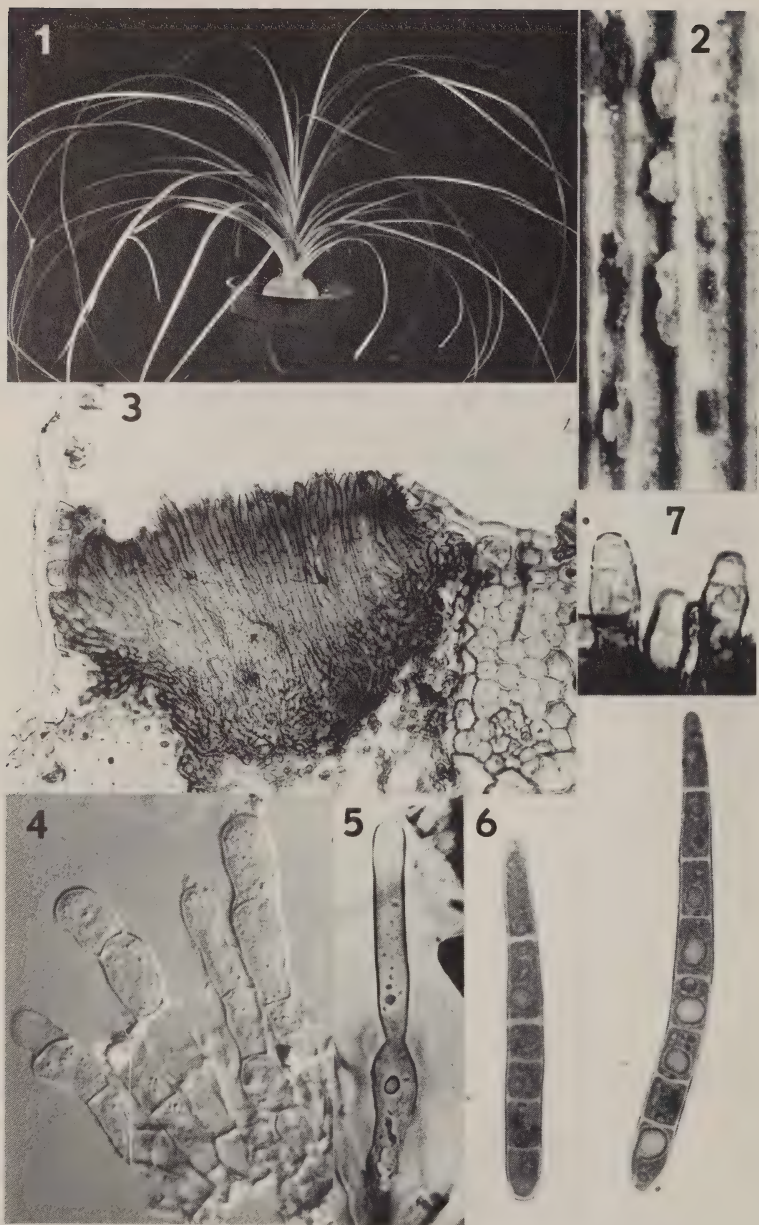
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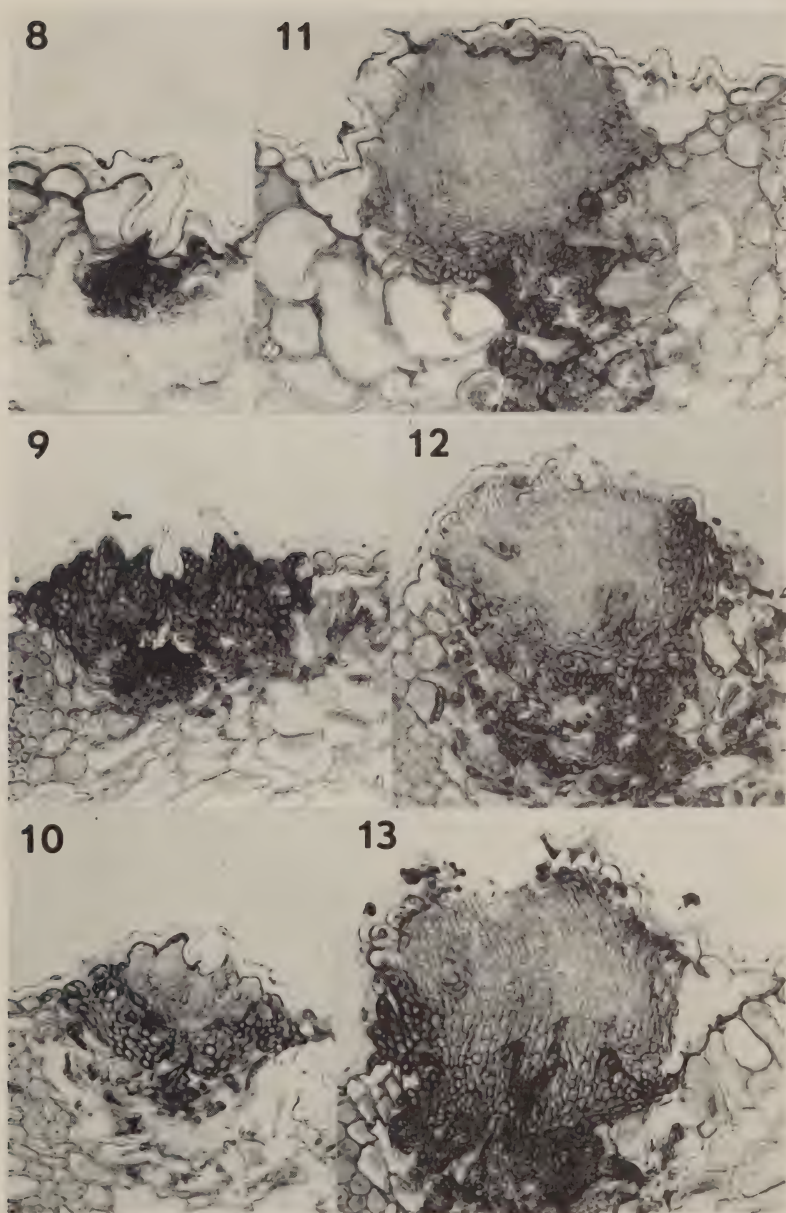
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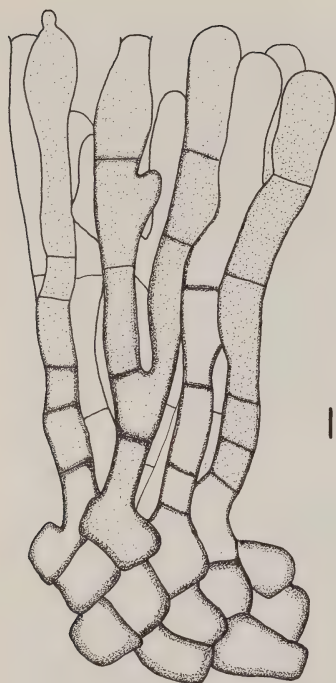
Fig. 1. The host *Beaucarnea recurvata*. Figs. 2-7. *Stigmina beaucarneae*. 2. Sporodochia covered by flaps of host tissue, x25. 3. Cross-section through a mature sporodochium, x250. 4. Columns of conidiophores forced apart. Interference contrast, x600. 5. Young conidium attached to a conidiogenous cell, x900. 6. Conidia stained with phloxine, x800. 7. Conidiogenous cells showing inconspicuous annellations, x1000.

Figs. 8-13. Development of sporodochia in *Stigmina beaucarneae*. 8. Substomatal hyphal cluster with hyphae passing through the stoma and between the guard cells. 9. Stomatal formation in the epidermis and mesophyll beneath a stoma. 10. Early stage in the production of conidiophores above the stomatal layer. 11. Young sporodochium pushing up the epidermis, with a foot-like stroma in the mesophyll. 12. Sporodochium with a loose prosenchymatous sub-base and conidiophores beginning to show the columnar arrangement. 13. Sporodochium with conidiophores in columns and a pseudoparenchymatous base. Fig. 8, x410. Figs. 9-13, x250.

Figs. 14-16. Conidiophores, conidiogenous cells and conidia of *Stigmina beaucarneae*. 14. Conidiophores and conidiogenous cells. 15. An older conidiogenous cell showing several annellations. 16. Conidia.







14



15



10μm



16



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THE XANTHOCHROIC REACTION IN APHYLLOPHORALES

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SUMMARY

Absorption spectra of aqueous, ethanol and methanol-HCl extracts from the basidiocarps of 65 species of aphyllorphoraceous fungi (including 27 Hymenochaetaceae species) were studied spectrophotometrically. Most of the Hymenochaetaceae species revealed similar and un-specific absorption spectra of the basidiocarp pigment extracts, representing steeply declining curves without any maxima, minima or inflections. All the Hymenochaetaceae species studied showed the xanthochroic reaction (darkening) on alkalization, but so were also many other brown or brownish as well as some light-coloured Aphyllophorales fungi besides the Hymenochaetaceae. The xanthochroic reaction is presumed to be due to a set of pigments which obviously represent polymerized phenolic compounds and is not caused by a single specific pigment. However, basidiocarps of several Hymenochaetaceae species contain certain compounds which reveal intensive absorption in the 335-350 nm region on alkalization of the extracts. Certain peculiarities of the basidiocarp absorption spectra could be distinguished, whereas non-hymenochaetaceous Aphyllophorales revealed greater diversity in their absorption spectra. According to the spectrophotometric data on pigment extracts, the genera *Phaeolus* s. str., *Pycnoporellus* and *Pyrofomes* do not belong to the Hymenochaetaceae. Two new combinations, *Phellinus microporus* (Pilát) Parm. and *Ph. jezoënsis* (Yamano) Parm., are proposed.

INTRODUCTION

Patouillard (1900) was probably the first to abandon the view that the shape of the basidiocarp and the configuration of the hymenophore are the most important characters in the taxonomy of fungi that are at present recognized as Aphyllophorales. In this respect Patouillard's *Série des Igniâires* (Basidiomycètes Homobasidiés: Aphyllophoracés: Porohydnes: Porés: Les Fomes) including the genera *Phellinus*, *Cyclomyces*, *Hydnochaete*, *Hymenochaete* and *Xanthochrous* (= *Onnia*, *Coltricia*, *Inonotus* as well as *Pyrofomes* and part of the *Phellinus* species) are of special interest. He considered the colour of basidiocarps and the existence of the setae ('cystides') to be characteristic of this group. Members of this group are

fungi with pileate as well as resupinate basidiocarps, with hymenophores either smooth, hydroid, with concentric gills, or poroid.

The idea of uniting these genera seemed evidently too bold even to Bourdot, one of the best-known mycologists, who has developed and elaborated the system of Patouillard (Bourdot & Galzin, 1928). Only Donk accepted Patouillard's ideas and complemented them (Donk, 1933, 1948, 1964); he also specified the taxonomic position of the group by describing it as a new subfamily in 1933, which he raised to the rank of a new family Hymenochaetaceae in 1948. Imazeki agreed to the views of Patouillard and Donk in his monograph of Hymenochaete already in 1940; nevertheless, he placed the genus Hymenochaete in the family of the "rudimental fungi of higher families", Corticiaceae (Imazeki, 1940: 2, 20).

Corner (1948, 1950) asserted that two clavarioid genera, *Lachnocladium* and *Clavariachaete*, should also be included in this group of fungi. The taxon described by Donk as a family he conventionally named the *Xanthochroia* series of the Basidiomycetes. Later he added: "... eventually it must be raised to the rank of a primary series of the Homobasidiomycetes, and the name Xanthochroales would seem more suitable" (Corner, 1950: 22-23).¹

Today many mycologists have accepted Patouillard-Donk's conception recognizing the Hymenochaetaceae as a family which unites certain polyporoid, hydroid and stereoid genera (Kotlaba & Pouzar, 1957; Kreisel, 1961; Jahn, 1967, 1971; Reid, 1969; Parmasto, 1969, 1971; Nobles, 1971; Niemelä, 1972; Vesely, Kotlaba & Pouzar, 1972; Domański, 1974, 1975; Ryvarden, 1976, 1978; Vasser & Sol-datova, 1977, and many others).

Some other taxonomists admit that the genera *Inonotus*, *Phellinus* and a few others differ from the rest of the polypores; they regard them as a separate family - the *Mucronoporaceae*, which they keep apart from the family Hymenochaetaceae s. str., i. e. from the genera having basidiocarps with a smooth hymenium (Imazeki & Toki, 1954 - n. v., cited after Donk, 1964; Imazeki & Hongo, 1957; Imazeki, Hongo & Tubaki, 1970; Domański, Orłóś & Skirgiełło, 1973; Wright & Deschamps, 1975 and some others).

The third group of taxonomists consider that hymenochaetaeous pore fungi belong to the family Polyporaceae s. l. (Overholts, 1953; Bondarzew, 1953; Komarova, 1964; Cunningham, 1965; Zerova, Radzievski & Shevchenko,

¹ Still, the Hymenochaetales was described as a new order only in 1977 (Oberwinkler, 1977: 89). The clavarioid genera noted by Corner as well as the genera *Scytinostroma*, *Vararia*, *Asterostroma*, which Donk (earlier) and Corner considered to be genera of Hymenochaetaceae, are at present usually regarded as a separate family Lachnocladiaceae (Reid, 1965; Donk, 1971; Parmasto, 1971). However, Pegler (1973) included them (with the exception of *Scytinostroma*) again under the Hymenochaetaceae.

1972; Lyubarski & Vasilyeva, 1975; Mazelaitis, 1976 a. o.).

Although most of them have admitted that this family is somewhat artificial, they do not take into consideration the affinity of "hymenochaetoid pore fungi" to the genera *Hymenochaete*, *Hydnochaete* and *Asterodon* (Hymenochaetaceae s. str.).

One of the most typical features of the family Hymenochaetaceae (s. l.), besides the existence of setae and the absence of clamps on hyphae, is the presence of the so-called xanthochroic basidiocarp. It is "a basidiocarp having the hyphae of the context and trama yellowish brown when observed in a water or acid mount, but dark brown when moistened with the potassium hydroxide solution" (Snell & Dick, 1957: 169). The xanthochroic reaction (or KOH test) is positive when the context of a basidiocarp permanently and noticeably darkens in an alkaline solution (cfr. Pegler, 1973: 414, 408).

In order to clear up the disputable problems of the taxonomy of the group of fungi under discussion, it would be essential to know what the xanthochroic reaction is and what is its value for taxonomy. It would be of special importance to learn if it is connected with the occurrence of a single pigment, or if involves several pigments.

Only suppositions are available about it in the literature. Donk noted (1933: 236): "Die schwarzbraune Verfärbung in KOH ist analog derjenigen, die bei den meisten (braunen) Phylacterioideae auftritt. Wahrscheinlich findet sich hier, wenn nicht Thelephora-säure, so doch ein verwandter Stoff". Later Donk does not repeat this supposition, yet he suggests that "The substance so characteristic of the Hymenochaetaceae deserves to be chemically more extensively analysed" (Donk, 1964: 241). Still later (1971: 22) he has to repeat: "The so-called xanthochroic reaction of the Hymenochaetaceae deserves to be more systematically studied".

So far the pigments of the basidiocarps of the Hymenochaetaceae have been studied only in case of a few species.

Zopf (1889) described the yellow pigments of *Polyporus* (= *Inonotus*) *hispidus* that are soluble in water and in ethanol, and stated that their absorption spectra are without any characteristic features and that absorption bands are missing.

Nadson (1891: 24-25) described the reddish-brown pigment of *Polyporus* (= *Phellinus*) *igniarius* as a weak acid resembling polyporic acid but soluble in water; the pigment takes on an intensively reddish-brown colour in a 0.5 to 5 per cent KOH solution.

As a conclusion from the study of the composition of the sterile conks of *Inonotus obliquus* (so-called birch cancer or chaga) Shvirina and her co-workers asserted that the pore fungi decomposing lignin have a powerful phenoxidase system. Due to the oxidase, accumulation of an amorphous dark-coloured (brown) substance takes place in hyphae. These are humin-like compounds ('fungus lignin'). This polyphenolic complex is a breakdown product of the oxidative condensation of the molecule of lignin attacked by the fungus.

The birch cancer as well as the cultured mycelia of *Inonotus obliquus*, *Phellinus igniarius* and *Fomes fomentarius* contain similar complexes. The composition of the complex depends on the character of the lignin used by the fungus. Unlike birch cancer and the cultured mycelium, the basidiocarps of *Inonotus obliquus*, *I. hispidus*, *Phellinus igniarius* and *Fomes fomentarius* have humin-like compounds of different composition: syringic and vanillic acids are absent among the acidic hydrolysis products, but there are p-hydrobenzoic, gallic and protocatechuic acids (Lovyagina, Shivrina & Platonova, 1958; Shivrina, Lovyagina & Platonova, 1959, 1960, 1961; Shivrina, 1961, 1965; Shivrina, Nizkovskaya & Platonova, 1965; Shivrina & Nizkovskaya, 1966; Shivrina, 1969). Shivrina (1961) points out that many pore fungi accumulate a highmolecular amorphous substance with some properties of humic acids. Basidiocarps of fungal species causing white rot contain a much more lignin-like substance than other wood-rotting species.

Malama and her co-authors (1975) characterized the pigment of the cultures of white-rot fungi *Armillariella mellea* (Fr.) Karst. (Agaricales), *Phellinus igniarius* and *Ph. tremulae* (Bond.) Bond. & Boriss. as melanins. They assert that these pigments are similar and may be separated into four fractions, analogous to the fractions of other natural melanins and the main groups of humic substances. The pigments make up 8 to 35 per cent of the dry substance of the mycelium. In one of her later papers Malama (1977) asserts that the two groups, melanin pigments and humic acids, differ from each other primarily in quantitative respects and not to such a degree in qualitative aspects.

Edwards, Lewis & Wilson (1961) found a new pigment - hispidin (a 4-hydroxy-6-styryl-2-pyrone) in (*Polyporus* (= *Inonotus*) *hispidus*). Bu'Lock and his co-workers described the pigments of *I. hispidus*; these appeared to consist of a mixture of methoxyl-free phenolic compounds. The principal constituent of the mixture is hispidin, enollactone of 3,4-dihydroxycinnamoylacetoacetic acid (Bu'Lock & Smith, 1961; Bu'Lock, Leeming & Smith, 1962). As the basidiocarp of *I. hispidus* grows old, the oxidation-polymerization of phenolic compounds into dark-coloured pigments takes place. The pigmented structural material of a mature *I. hispidus* basidiocarp can be described as lignin-like. They note that phenolic pigments of the hispidin type are probably of wider distribution in the Polyporaceae (= Hymenochaetaeae! - E.P.).

In one of their later papers Bu'Lock & Walker (1967) show the similarity between the pigments of *Inonotus hispidus* and of sterile conks of *I. obliquus*.

Flasson, Gluchoff-Flasson & Steglich (1977) found 3,14'-bihispidinyl in *Phellinus pomaceus* and hypholomin B in *Ph. robustus* var. *robintiae*; these are compounds derived from or related to dehydrohispidin.

Kirk, Lorenz & Larsen (1975) characterized the xanthochroic pigment of the basidiocarp of *Phellinus igniarius* extracted by means of dioxane-water. The pigment is a phenolic compound formed by the oxidative polymerization of a molecule containing 3,4-dihydroxyphenyl moiety. The dark colour of the pigment probably reflects the presence of o-quinones and their condensation products. The pigment is evidently responsible for the positive KOH test in *Inonotus hispidus*, *Phaeolus schweinitzii* and *Phellinus igniarius*. It may be assumed that hispidin (or another related compound) is the

precursor of this pigment. Vanillic acid and syringic acid derivatives were not established among the products of the oxidative degradation of ethylated samples. However, Shivrina, Platonova & Nizkovskaya (1973) found derivatives of vanillic acid in the hydrolysates of humus-like complexes obtained from the cultures of *Fomes fomentarius*, *Inonotus obliquus* and *Phellinus pini*. They also found syringic acid derivatives, when *I. obliquus* and *Ph. pini* were cultivated in a medium containing birch sawdust, but not when pine sawdust was used.

Yefimenko and Ageyenkova (1965) extracted other pigments unsimilar to those above from the basidiocarps of *Phellinus pini* var. *abietis* f. *laricis* (= *Ph. chrysoloma*) and *Ph. igniarius* and characterized them. The pigments belong to flavonoids, obviously to the group of chalcones or aurones. But as these pigments constitute only about 0.01 to 0.02 per cent of the dry matter of the fungus, we cannot take them for the main pigments of these species. According to Shivrina (1961), the lignin-like matter in pore fungi causing white rot ranges from 20 to 36 per cent of dry weight of the fungus.

Proceeding from these data we can suppose that the brown or brownish colour of the basidiocarps of xanthochroic polypores is imparted not by one pigment of a certain composition, but by a set of pigments, representing the polymerized phenolic compounds. This complex is apparently somewhat different in different species, especially in the fungi which grow on coniferous or deciduous wood, and most probably even on different specimens of the same species and in basidiocarps of different ages, depending on different stages of polymerization.

Colour as a characteristic of great importance is widely used in the taxonomy of Aphyllophorales (and of other fungi) almost equally at species and genus levels. However, it is a macroscopic and subjective feature. Almost the same colour may be caused by chemically very different pigments; this may be the case with the xanthochroic pigments of Hymenochaetaceae. The complicated chemical analysis of a great number of species and specimens is still unrealizable; we do not know the exact composition of all the pigments of even the best studied species.

One of the objective ways to characterize colour (and the xanthochroic reaction) is to investigate the absorption spectra of basidiocarp extracts. Undoubtedly, this is a primitive method, but it allows us to compare the pigments of a great number of basidiocarps. This method was applied in the taxonomy of Aphyllophorales first by Schatz and his co-workers (1956), who demonstrated the identity of the pigments of two *Pycnoporus* species.

MATERIALS AND METHODS

For spectrophotometric studies dried basidiocarps were used (collected usually one to three years ago): 27 species belonging to the family Hymenochaetaceae and 38 species of other aphyllophoraceous fungi, altogether 93 samples. The following genera of Hymenochaetaceae

were represented: *Phellinus* - 14 species, *Inonotus* - 8, *Hymenochaete* - 3, *Polystictus* - 2 species, *Asterodon*, *Coltricia*, *Inonotopsis* - 1 species each. By way of comparison were also used some other aphyllophoraceous fungi with brown or brownish basidiocarps of the genera *Amylostereum*, *Columnocystis*, *Daedalea*, *Datronia*, *Fomes*, *Fomitopsis*, *Ganoderma*, *Gloeophyllum*, *Gloeoporus*, *Hirschioporus*, *Hydnellum*, *Phaeolus*, *Punctularia*, *Pyrofomes*, *Sarcoporia*, and some species with relatively light-coloured basidiocarps of the genera *Amyloporia*, *Antrodia* (*Corirolellus*), *Climacocystis*, *Cerrena*, *Coriolus*, *Dichomitus*, *Diplomitoporus*, *Impex*, *Laetiporus*, *Laricifomes*, *Lenzites* and *Trametes* s.str.

Pieces were cut from dried basidiocarps, avoiding any accidental foreign substance from aside getting into the sample. Of the fungi with perennial basidiocarps, only the parts grown during the two or three last growing seasons were used. The pieces were ground to powder; from each specimen 100 mg was weighed, put into test-tubes and then poured over with 10 ml of the extract solvent. For extraction were used: 1) distilled water, 2) ethanol 96°, and 3) a mixture of methanol and conc. HCl (94 : 6). The liquids were heated at 60 to 65° C: ethanol and methanol extracts were heated for 20 minutes and aqueous extracts - for 1 hour. The extracts were kept for 24 hours at 18 to 20° C and were centrifuged. The obtained extracts were used to determine the absorption spectra in 1-cm cuvettes within a range of 320 to 650 nm wavelengths with the help of spectrophotometer of the type SF-4A or a Specord UV-VIS. After the determination of the spectra in aqueous and ethanol extracts, they were alkalized by adding 0.2 ml of 1 : 1 diluted conc. NH_4OH and the absorption spectra were determined once more.

Part of the samples were studied once again after an interval of 6 years; the powder of the ground basidiocarps were kept in closed glass vials at room temperature. The absorption spectra appeared to be practically the same.

The basidiocarps examined¹

HYMENOGHAETACEAE

1. *Asterodon ferruginosus* Pat. - Komi ASSR, Kočmes, on *Picea obovata*. TAA 17522.
2. *A. ferruginosus* - Sachalin, Južno-Sachalinsk, on *Abies sachalinensis*. TAA 55246.
3. *Coltricia perennis* (Fr.) Murrill - Sachalin, Južno-Sachalinsk. TAA 55263.
4. *Hymenochaete fuliginosa* (Pers.) Bres. - Caucasus, Stavropol'skij Terr., Archyz, on *Abies nordmanniana*. TAA 53243.
5. *H. rubiginosa* (Fr.) Lév. - Zakarpatskaja Prov., Ugol'skoje, on *Carpinus betulus*. TAA 3601.
6. *H. tabacina* (Fr.) Lév. - Sachalin, Južno-Sachalinsk, on *Alnus hirsuta*. TAA 55300.
7. *Inonotopsis subiculosa* (Peck) Parm. - Archangel'skaja Prov., Jemca, on *Pinus sylvestris*. TAA 18415.
8. *Inonotus cuticularis* (Fr.) Karst. - Hungary. Herb. Z. Igmándy 1260.

¹ Geographical names are given according to the Political-administrative Map of the Union of Soviet Socialist Republics (Moscow, 1976).

9. *Inonotus dryophilus* (Berk.) Murrill - Byelorussian SSR, Belovežskaja Pušča, on *Quercus robur*. TAA 102101.
10. *I. obliquus* (Fr.) Pilát - Estonian SSR, on *Betula pendula*. TAA 18323.
11. *I. radiatus* (Fr.) Karst. - Estonian SSR, on *Corylus avellana*. TAA 54793.
12. *I. radiatus* - Kamčatka, Južnyje Kor'aki, on *Alnus kamtschatica*. TAA 71/228.
13. *I. rheades* (Karst.) Karst. - Krasnojarskij wildlife area, on *Populus tremula*. TAA 55347.
14. *I. tamaricis* (Pat.) Maire - Turkmen SSR, Kara-Kala, on *Tamarix* sp. TA 55061.
15. *I. weirii* (Murrill) Kotl. & Pouz. - Canada, British Columbia. DAOM 8734.
16. *I. weirii* - Krasnojarskij Terr., Badžei, on *Abies sibirica*. TAA 9737.
17. *I. weirii* - Krasnojarskij wildlife area, on *Abies sibirica*. TAA 71491.
18. *I. weirii* - Gorno-Altajskaja Auton. Prov., near Teleckoje L., on *Larix sibirica*. TAA 7870.
19. *Onnia triqueter* (Fr.) Imaz. - Kurile Is., Kunašir, on *Picea microsperma*. TAA 12979.
20. *Phellinus alni* (Bond.) Parm. - Estonian SSR, on *Alnus incana*. TAA 70/212.
21. *Ph. chrysoloma* (Fr.) Donk - Polar Ural, on *Larix sibirica*. TAA 70/151.
22. *Ph. chrysoloma* - Krasnojarskij wildlife area, on *Picea obovata*. TAA 71/511.
23. *Ph. chrysoloma* - Estonian SSR, on *Picea abies*. TAA 71/296.
24. *Ph. chrysoloma* - Estonian SSR, on *Picea abies*. TAA 71/297.
25. *Ph. ferrugineo-fuscus* (Karst.) Bourd. - Estonian SSR, on *Picea abies*. TAA 4499.
26. *Ph. ferruginosus* (Fr.) Pat. - Norway, Buskerud, on *Corylus avellana*. Leg. L. Ryvarden 2. X 1969.
27. *Ph. hartigii* (All. & Schn.) Pat. - Caucasus, Teberda wildlife area, on *Abies nordmanniana*. TAA 53074.
28. *Ph. hartigii* - L'vovskaja Prov., Truskavec, on *Abies alba*. TAA 1969/1.
29. *Ph. jezoënsis* (Yamano) Parm.¹ - Sachalin, Južno-Sachalinsk, on *Picea microsperma*. TAA 55249.
30. *Ph. microporus* (Pilát) Parm.² - Kamčatka, Južnyje Kor'aki, on *Pinus pumila*. TAA 55212.
31. *Ph. nigricans* (Fr.) Karst. - Kamčatka, Južnyje Kor'aki, on *Betula ermanii*. TAA 71/413.
32. *Ph. nigricans* - Kamčatka, Južnyje Kor'aki, on *Betula ermanii*. TAA 71/437.
33. *Ph. nigrolimitatus* (Romell) Bourd. & Galz. - Caucasus, Caucasian wildlife area, on *Abies nordmanniana*. TAA 18729.

¹ *Phellinus jezoënsis* (Yamano) Parm. comb. nova. - Basionymum: *Daedalea jezoënsis* Yamano, Goryorin No. 25, 70. 1930 (n. v.; cited by Donk, Check List Eur. Polyp., p. 327, 382. 1974).

² *Phellinus microporus* (Pilát) Parm. stat. novus. - Basionymum: *Phellinus pini* (Fr.) A. Ames var. *abietis* (Karst.) Pilát f. *microporus* Pilát, Atlas Polyp. p. 251, tab. 351 a. 1942.

34. *Ph. pilātii* Černý - Hungary, near Bugac, on *Populus alba*. Herb. Z. Igmándy 1447.
35. *Ph. pini* (Fr.) A. Ames - Estonian SSR, on *Pinus sylvestris*. TAA 70294.
36. *Ph. pini* - Estonian SSR, on *Pinus sylvestris*. TAA 70/295.
37. *Ph. pomaceus* (S.F. Gray) Maire - Estonian SSR, on *Prunus insititia*. TAA 70/288.
38. *Polystictus tomentosus* (Fr.) Fr. - Sachalin, Južno-Sachalinsk. TAA 55299.

OTHER FAMILIES

39. *Amyloporia xantha* (Fr.) Bond. & Sing. - Yakut ASSR, Spaskaja Pad', on *Salix caprea*. TAA 56152.
40. *Amylostereum chailletii* (Fr.) Boid. - Estonian SSR, on *Picea abies*. TAA 9697.
41. *Antrodia sinuosa* (Fr.) Karst. - Yakut ASSR, Spaskaja Pad', on *Larix dahurica*. TAA 56133.
42. *Cerrena unicolor* (Fr.) Murrill - Yakut ASSR, Spaskaja Pad', on *Betula platyphylla*. TAA 56190.
43. *Climacocystis borealis* (Fr.) Kotl. & Pouz. - Caucasus, Teberda wildlife area, on *Picea orientalis*. TAA 53163.
44. *Columnocystis abietina* (Fr.) Pouz. - Archangel'skaja Prov., Jemca, on *Picea obovata*. TAA 13395.
45. *Coriolus hirsutus* (Fr.) Quél. - Yakut ASSR, Spaskaja Pad', on *Alnaster fruticosus*. TAA 56878.
46. *C. pubescens* (Fr.) Quél. - Yakut ASSR, Spaskaja Pad', on *Betula platyphylla*. TAA 56184.
47. *Daedalea quercina* Fr. - Krasnodarskij Terr., Pjatigorskoje, on *Quercus petraea*. TAA 19867.
48. *Datronia scutellata* (Schw.) Domański - Yakut ASSR, Olen'ok, on *Alnaster fruticosus*. TAA 56023.
49. *Dichomitus squalens* (Karst.) D. Reid - Yakut ASSR, Ust'-Nera, on *Larix dahurica*. TAA 56341.
50. *Diplomitoporus flavescens* (Bres.) Domański - Estonian SSR, on *Pinus sylvestris*. TAA 54709a.
51. *Fomes fomentarius* (Fr.) Fr. - Yakut ASSR, Spaskaja Pad', on *Betula platyphylla*. TAA 56123.
52. *F. fomentarius* - Polar Ural, on *Betula kusmisseffii*. TAA 70/102.
53. *Fomitopsis cajanderi* (Karst.) Kotl. & Pouz. - Yakut ASSR, Spaskaja Pad', on *Larix dahurica*. TAA 56137.
54. *F. rosea* (Fr.) Karst. - Caucasus, Caucasian wildlife area, on *Abies nordmanniana*. TAA 19613.
55. *Ganoderma applanatum* (S.F. Gray) Pat. - Kamčatka, Kor'aki, on *Populus suaveolens*. TAA 55223.
56. *G. applanatum* - Estonian SSR. TAA 54903.
57. *Gloeophyllum abietinum* (Fr.) Karst. - Estonian SSR, on *Picea abies*. TAA 6607.
58. *G. protractum* (Fr.) Imaz. - Yakut ASSR, Spaskaja Pad', on *Larix dahurica*. TAA 71/56.
59. *G. protractum* - Caucasus, Teberda wildlife area, on *Picea orientalis*. TAA 53155.
60. *G. sepiarium* (Fr.) Karst. - Estonian SSR, on *Picea abies*. TAA 55374.
61. *G. sepiarium* - Estonian SSR, on *Picea abies*. TAA 1528.
62. *G. sepiarium* - Yakut ASSR, Pokrovsk, on *Picea obovata*. TAA 56823.

63. *Gloeoporus dichrous* (Fr.) Bres. - Yakut ASSR, Spaskaja Pad', on *Larix dahurica*. TAA 56172.
64. *G. dichrous* - Yakut ASSR, Spaskaja Pad', on *Betula platyphylla*. TAA 56181.
65. *Hirschioporus laricinus* (Karst.) Teramoto - Yakut ASSR, Čerski, on *Larix dahurica*. TAA 56400.
66. *H. laricinus* - Yakut ASSR, Honuu, on *Larix dahurica*. TAA 56666.
67. *H. pargamenus* (Fr.) Bond. & Sing. - Yakut ASSR, Spaskaja Pad', on *Betula platyphylla*. TAA 56847.
68. *Hydnellum* sp. - Sachalin, Južno-Sachalinsk. TAA 55265.
69. *Irpex lacteus* (Fr.) Fr. - Yakut ASSR, Spaskaja Pad', on *Betula platyphylla*. TAA 56141.
70. *Laetiporus sulphureus* (Fr.) Murrill - Yakut ASSR, Spaskaja Pad', on *Larix dahurica*. TAA 56135.
71. *L. sulphureus* - Polar Ural, on *Larix sibirica*. TAA 70/102.
72. *Laricifomes officinalis* (Fr.) Kotl. & Pouz. - Yakut ASSR, Spaskaja Pad', on *Larix dahurica*. TAA 56897.
73. *Lenzites betulina* (Fr.) Fr. - Yakut ASSR, Spaskaja Pad', on *Betula platyphylla*. TAA 56192.
74. *L. warnieri* Dur. & Mont. - Krasnodarskij Terr., on *Fraxinus excelsior*. TAA 18863.
75. *Phaeolus schweinitzii* (Fr.) Pat. - Sachalin, Južno-Sachalinsk, on *Larix kurilensis*. TAA 55280.
76. *Ph. schweinitzii* - Estonian SSR, on *Pinus sylvestris*. TAA 3149.
77. *Ph. schweinitzii* - Kurile Is., Kunašir, on *Abies sachalinensis*. TAA 14186.
78. *Polyporus varius* Fr. var. *nummularius* Fr. - Yakut ASSR, Spaskaja Pad', on *Alnaster fruticosus*. TAA 56157.
79. *Punctularia strigoso-zonata* (Schw.) Talbot - Krasnojarskij Terr., Kolčim, on *Populus tremula*. TAA 7681.
80. *Pycnoporellus albo-luteus* (Ell. & Ev.) Kotl. & Pouz. - Caucasus, Caucasian wildlife area, on *Abies nordmanniana*. TAA 18738.
81. *P. albo-luteus* - Komi ASSR, Ust'-Kulom, on *Picea obovata*. TAA 8333.
82. *P. fulgens* (Fr.) Donk - Yakut ASSR, Spaskaja Pad', on *Larix dahurica*. TAA 56858.
83. *P. fulgens* - Estonian SSR, on *Picea abies*. TAA 4801.
84. *P. fulgens* - Chabarovskij Terr., Selichino, on *Larix dahurica*. TAA 14204.
85. *P. fulgens* - Krasnojarskij Terr., Kulumysh, on *Populus tremula*. TAA 7753.
86. *P. fulgens* - Estonian SSR, on *Picea abies*. TAA 1671.
87. *Pyrofomes demidoffii* (Lév.) Kotl. & Pouz. - Turkmen SSR, Kopet-Dagh, on *Juniperus turcomanica*. TAA 102103.
88. *Sarcoporia salmonicolor* (Berk. & Curt.) Domański - Komi ASSR, Ust'-Kulom, on *Pinus sylvestris*. TAA 8292.
89. *S. salmonicolor* - Gorno-Altajskaja Auton. Prov., Altai wildlife area, on *Pinus sibirica*. TAA 8617.
90. *Trametes cervina* (Schw.) Bres. - Yakut ASSR, Spaskaja Pad', on *Betula platyphylla*. TAA 56189.
91. *T. cervina* - Yakut ASSR, Oim'akon, on *Larix dahurica*. TAA 55992.
92. *T. suaveolens* (Fr.) Fr. - Estonian SSR, on *Salix pentandra*. TAA 54675.
93. *Tyromyces mollis* (Fr.) Karst. - Estonian SSR, on *Picea abies*. TAA 3541.

RESULTS

Occurrence and Intensity of the Xanthochroic Reaction

In almost all the species studied the absorption curve of the pigment extract is a descending line with a comparatively high degree of extinction in the short-wave region of the visible spectrum (Figs. 1 and 2). Due to such absorption curve, the darkness of the extract is quantitatively characterized by the extinction (optical density) E at two properly selected wavelengths, 400 nm and 450 nm.

The alkalization of fungal extracts by the addition of NH_4OH caused their darkening which may be characterized in different ways. One of the possibilities is to compare visually the absorption curves of unalkalized and alkalized extracts (see next chapters). The second way is to compare quantitatively the intensity of absorption at certain selected wavelengths.

The darkening of the pigment extract by alkalization is proposed to be characterized by the xanthochroic coefficient α indicating how many times the extinction E' of the alkalized extract is higher than that of the non-alkalized extract at certain wavelengths ($\alpha = E' : E$). The results of the spectrophotometric measurements are presented in Tables 1 and 2. The species of Hymenochaetaceae are indicated with an asterisk. When E is mentioned to have a value of 1.5 or more, it has been calculated on the basis of the extinction of a diluted extract.

TABLE 1.

EXTINCTIONS (E) AND THE XANTHOCHROIC DARKENING COEFFICIENTS (α) OF PIGMENT EXTRACTS IN DARK-COLOURED SPECIES

Species, no. of sample	aqueous extract				ethanol extract			
	400 nm		450 nm		400 nm		450 nm	
	E	α	E	α	E	α	E	α
<i>Pycnoporellus fulgens</i> 86	0.68	0.79	1.14	0.89	0.46	0.74	1.38	0.74
<i>P. fulgens</i> 84	0.31	0.84	0.21	0.76	0.80	0.80	1.14	0.68
<i>P. fulgens</i> 83	0.60	0.92	0.40	0.95	0.99	0.90	1.30	0.69
<i>P. fulgens</i> 82	0.17	1.03	0.13	0.69	0.31	0.87	0.41	0.66
<i>P. fulgens</i> 85					0.82	0.77	1.01	0.68
<i>P. albo-luteus</i> 80	0.93	1.03	0.62	1.00	0.54	0.89	0.57	0.79
<i>Punctularia strigoso-zonata</i> 79	2.82	1.03	1.71	1.11	1.06	0.92	0.68	0.71
* <i>Phellinus ferruginosus</i> 26	0.69	1.04	0.43	0.88	0.19	1.26	0.07	1.78
<i>Fomitopsis cajan-deri</i> 53	0.33	1.08	0.21	1.07	0.05	1.22	0.03	1.14
<i>Hydnellum</i> sp. 68	0.63	1.08	0.35	1.14	0.09	1.00	0.06	0.91
* <i>Phellinus pilatii</i> 34	0.44	1.09	0.25	1.22	0.99	1.10	0.33	2.59

TABLE 1. (continued)

Species, no. of	aqueous extract				ethanol extract			
	400 nm		450 nm		400 nm		450 nm	
	sample							
	E	x	E	x	E	x	E	x
<i>Columnocystis abietina</i> 44	0.59	1.10	0.33	1.18	0.09	1.47	0.04	1.37
* <i>Inonotus dryophillus</i> 9	1.08	1.10	0.29	1.63	0.23	1.31	0.07	1.86
* <i>I. obliquus</i> 10	1.08	1.11	0.45	1.50	0.33	1.36	0.15	1.72
* <i>Coltricia perennis</i> 3	0.16	1.13	0.18	1.33	0.06	1.11	0.04	1.28
<i>Pycnoporellus albo-luteus</i> 81	0.56	1.14	0.35	1.09	0.37	1.30	0.40	1.00
<i>Ganoderma applanatum</i> 55	0.56	1.14	0.31	1.39	0.11	1.24	0.05	1.60
<i>Gloeophyllum abietinum</i> 57	0.61	1.15	0.37	1.25	0.54	1.02	0.24	1.19
<i>G. protractum</i> 58	0.32	1.16	0.19	1.24	4.08	0.32	2.93	0.52
* <i>Phellinus pini</i> 35	0.31	1.18	0.12	1.43		1.17		1.86
* <i>Inonotus weirii</i> 15	1.23	1.20	0.65	1.38	0.29	1.28	0.09	1.85
<i>Gloeophyllum sepiarium</i> 60	0.31	1.21	0.21	1.28	3.12	0.68	3.30	0.61
<i>Pycnoporellus fibrillosus</i> 85	0.42	1.21	0.82	0.83	0.25	1.20	1.14	0.72
* <i>Inonotus weirii</i> 16	0.40	1.22	0.23	1.24	1.02	1.44	0.41	2.30
<i>Ganoderma applanatum</i> 56	0.45	1.22	0.29	1.29				
* <i>Polystictus tomentosus</i> 38	0.15	1.23	0.06	1.58	0.13	2.88	0.09	2.17
<i>Tyromyces mollis</i> 93	0.22	1.25	0.10	1.30	4.30	0.86	1.50	1.17
<i>Gloeophyllum protractum</i> 59	0.24	1.25	0.15	1.47	2.80	0.80	2.00	0.83
* <i>Inonotus cuticularis</i> 8	0.82	1.27	0.36	1.78	0.14	1.53	0.06	1.91
* <i>Phellinus pomaceus</i> 37	0.20	1.31	0.02	4.00	0.53	1.02	0.21	1.57
* <i>Ph. nigricans</i> 31	0.60	1.32	0.27	1.74	0.16	1.09	0.08	1.93
* <i>Inonotus radiatus</i> 12	0.45	1.33	0.18	1.55	0.23	1.00	0.07	1.57
* <i>Phellinus jezoensis</i> 29	0.60	1.33	0.15	3.08	9.60	1.01	3.90	1.96
* <i>Inonotus tamariensis</i> 14	0.35	1.37	0.13	1.92	0.57	1.28	0.24	1.87
<i>Fomitopsis rosea</i> 54	0.23	1.41	0.14	1.04	0.06	1.08	0.01	1.33
<i>Gloeophyllum sepiarium</i> 61	0.26	1.41	0.06	2.75	4.05	0.34	3.45	0.44
<i>Phaeolus schweinitzii</i> 75	0.86	1.42	1.26	2.48	0.90	1.75	0.10	3.50
<i>Gloeophyllum sepiarium</i> 62	0.48	1.43	0.33	1.38	3.25	0.69	2.40	0.54
<i>Amylostereum chailletii</i> 40	0.59	1.44	0.28	1.64	0.17	1.66	0.06	1.92

TABLE 1. (continued)

Species, no. of sample	aqueous extract				ethanol extract			
	400 nm		450 nm		400 nm		450 nm	
	E	x	F	x	E	x	E	x
* <i>Phellinus micro-</i> <i>porus</i> 30	0.42	1.45	0.16	2.08	0.67	1.43	0.26	2.23
* <i>Inonotus radia-</i> <i>tus</i> 11	0.15	1.45	0.04	3.57				
<i>Fomitopsis scu-</i> <i>tellata</i> 48	1.00	1.50	0.39	1.54				
* <i>Inonotus rheades</i> 13	0.21	1.52	0.07	2.43	0.46	1.35	0.18	2.50
* <i>Phellinus chryso-</i> <i>loma</i> 21	0.46	1.52	0.16	2.44				
* <i>Ph. alni</i> 20	0.22	1.55	0.10	2.16		1.07		1.32
* <i>Ph. nigrolimita-</i> <i>tus</i> 33	0.33	1.58	0.14	2.07	0.35	1.14	0.12	2.50
* <i>Hymenochaete rubi-</i> <i>ginosa</i> 5		1.59		1.92	0.72	1.72	0.26	2.54
<i>Fomes fomentarius</i> 51	0.56	1.59	0.08	1.88	0.32	1.66	0.02	4.00
* <i>Phellinus nigri-</i> <i>cans</i> 32	0.30	1.60	0.12	2.44				
* <i>Ph. hartigii</i> 27	0.15	1.62	0.06	2.18	0.20	0.98	0.07	1.31
* <i>Inonotus weirii</i> 17	0.19	1.74	0.33	2.54	0.39	1.20	0.37	3.70
* <i>Onnia triqueter</i> 19	0.07	1.77	0		0.11	1.24	0.05	1.78
* <i>Phellinus chryso-</i> <i>loma</i> 22	0.21	1.83	0.06	3.33				
* <i>Ph. chrysoloma</i> 23	0.38	1.82	0.05	7.20	2.10	1.05	0.62	2.65
* <i>Ph. hartigii</i> 28	0.12	2.17	0.04	3.29	0.80	1.25	0.29	2.80
<i>Phaeolus schwei-</i> <i>nitzii</i> 76	4.00	2.48	0.64	6.73	8.40	2.27	0.30	14.20
* <i>Phellinus pini</i> 36	0.17	2.53	0					
* <i>Ph. chrysoloma</i> 24	0.15	3.10	0		1.28	1.07	0.51	1.96
<i>Fomes fomentarius</i> 52	0.23	4.33	0		0.09		0.04	
<i>Phaeolus schwei-</i> <i>nitzii</i> 77	11.00	9.27	0.56	8.44	42.00	3.10	0	
<i>Pyrofomes demi-</i> <i>doffii</i> 87	0.03	15.00	0		0.60	1.50	0.35	1.77
* <i>Asterodon ferru-</i> <i>ginosum</i> 1	0		0		0.13	1.16	0.05	1.70
* <i>A. ferruginosum</i> 2					0.15	1.53	0.06	2.34
* <i>Hymenochaete ta-</i> <i>bacina</i> 6					0.36	0.92	0.07	2.14
* <i>Inonotopsis sub-</i> <i>culosa</i> 7					0.49	1.35	0.20	1.90
* <i>Phellinus ferrugi-</i> <i>neo-fuscus</i> 25					0.96	1.66	0.35	3.18
* <i>Inonotus weirii</i> 18					0.30	1.28	0.09	1.87
* <i>Hymenochaete fuli-</i> <i>ginosa</i> 4					0.22	1.15	0.08	1.40

TABLE 2.

EXTINCTIONS (E) AND THE XANTHOCHROIC DARKENING COEFFICIENTS (x) OF PIGMENT EXTRACTS IN LIGHT-COLOURED SPECIES

Species, no. of sample	aqueous extract				ethanol extract			
	400 nm		450 nm		400 nm		450 nm	
	E	x	E	x	E	x	E	x
<i>Laetiporus sulphureus</i> 70	0.24	0.92	0.15	0.88	0.14	1.29	0.05	1.16
<i>Climacocystis borealis</i> 43	0.51	0.98	0.27	0.96	0.09	1.22	0.04	1.13
<i>Trametes suaveolens</i> 92	0.02	1.00	0					
<i>Hirschioporus paragamenus</i> 67	0.21	1.00	0.13	1.00	0.02	1.00	0.01	1.00
<i>Lenzites betulina</i> 73	0.50	1.11	0.23	1.09	0.07	1.75	0	
<i>Trametes cervina</i> 90	0.43	1.06	0.30	0.96	1.27	0.91	0.53	0.91
<i>Hirschioporus laricinus</i> 65	0.29	1.17	0.15	1.11	0.03	1.00	0.02	1.00
<i>H. laricinus</i> 66	0.36	1.25	0.20	1.20				
<i>Trametes cervina</i> 91	0.37	1.18	0.23	1.09	0.05	2.00	0.03	2.00
<i>Cerrrena unicolor</i> 42	0.28	1.21	0.20	1.13	0.03	8.00	0	
<i>Gloeoporus dichrous</i> 63.	0.42	1.21	0.30	1.32	0.31	1.03	0.17	1.36
<i>Lenzites warnieri</i> 74	0.12	1.26	0.06	1.15	0.04	1.12	0.02	1.00
<i>Daedalea quercina</i> 47	0.17	1.26	0.09	1.28	0.08	1.07	0.04	1.14
<i>Dichomitus squa-</i> <i>lens</i> 49	0.23	1.26	0.12	1.21	0.07	1.36	0.03	1.30
<i>Laetiporus sulphureus</i> 71	0.20	1.27	0.10	1.42	0.06	1.25	0.04	1.14
<i>Coriolus pubescens</i> 46	0.14	1.30	0.07	1.14	0.04	1.13	0.02	1.00
<i>Irpex lacteus</i> 69	0.51	1.31	0.23	1.24	0.16	2.50	0.03	2.50
<i>Gloeoporus dichrous</i> 64	0.50	1.33	0.34	1.54	0.44	1.09	0.26	1.26
<i>Polyporus varius</i> 78	1.27	1.42	0.50	1.40	0.08	2.90	0.02	3.50
<i>Coriolus hirsutus</i> 45	0.26	1.65	0		0.09	1.78	0	
<i>Diplomitoporus flavescens</i> 50	0.18	2.00	0					
<i>Amyloporia xantha</i> 39	0.08	2.50	0.04	2.25				

Absorption spectra of Aqueous Extracts

The absorption spectra of aqueous basidiocarp extracts of the majority of species studied are qualitatively rather similar and un-specific, representing usually more or less gently declining curves without any maxima or minima and ending already in a region of 500 to 600 nm. The curves of alkalinized aqueous extracts are similar to those of unalkalinized ones, but exhibit enhanced absorption (*Coltricia perennis*, *Inonotus radiatus*, *Phellinus ferruginosus*, *Ph. pilatii*, *Polystictus tomen-*

tosus, *Inonotus weirii* No. 15, 16 and 18 a. o.; see Fig. 1). The same type of absorption is also revealed by some brownish or brown non-hymenochaetaceous fungi (*Amylostereum chailletii*, *Columnocystis abietina*, *Fomitopsis cajanderi*, *F. rosea*, *F. scutellata*, *Ganoderma applanatum*, *Gloeophyllum abietinum*, *Hydnellum* sp., *Sarcoporia salmicolor*). Most of the light-coloured non-hymenochaetaceous species have also the same type of absorption, but in most cases the absorption is less intensive (*Amyloporia xantha*, *Anurodia sinuosa*, *Cerrena unicolor*, *Climacocystis borealis*, *Coriolus hirsutus*, *C. pubescens*, *Daedalea quercina*, *Dichomitus squalens*, *Diplomitoporus flavescens*, *Hirschioporus laricinus*, *H. pargamensis*, *Irpex lacteus*, *Laricifomes officinalis*, *Lenzites betulina*, *L. warrineri*, *Polyporus varius* var. *nummularius*, *Trametes cervina*, *T. suaveolens*, *Tyromyces mollis*). Some of them have rather short absorption curves, which end near 410 nm (*Trametes suaveolens*) or near 440 nm (*Diplomitoporus flavescens*).

Laetiporus sulphureus has a similar absorption curve, but the curve of the alkalinized extract exhibits less intensive absorption than that of the unalkalinized one.

The absorption curves of the second group of species are similar to the curves of the first group, but the curve of the alkalinized extract has a weak or distinctive inflexion at about 330 to 350 nm. All the fungi of this group are species of Hymenochaetaceae (*Asterodon ferruginosus*, *Hymenochaete rubiginosa*, *Inonotus cuticularis*, *I. dryophilus*, *I. obliquus*, *I. tamaricis*, *Onnia triqueter*, *Phellinus alni*, *Ph. chrysoloma*, *Ph. microporus*, *Ph. nigricans*, *Ph. pini*, *Ph. pomaceus*, *Inonotus weirii* No. 17, *Phellinus hartigii* No. 27; see Fig. 2). Some other species (*Inonotus rheades*, *Phellinus nigrolimitatus*, *Ph. jezoensis*, *Ph. hartigii* No. 28) have instead of an inflexion a maximum at 335 to 340 nm (Fig. 3).

Some non-hymenochaetaceous fungi have characteristic absorption curves different from those of all other species:

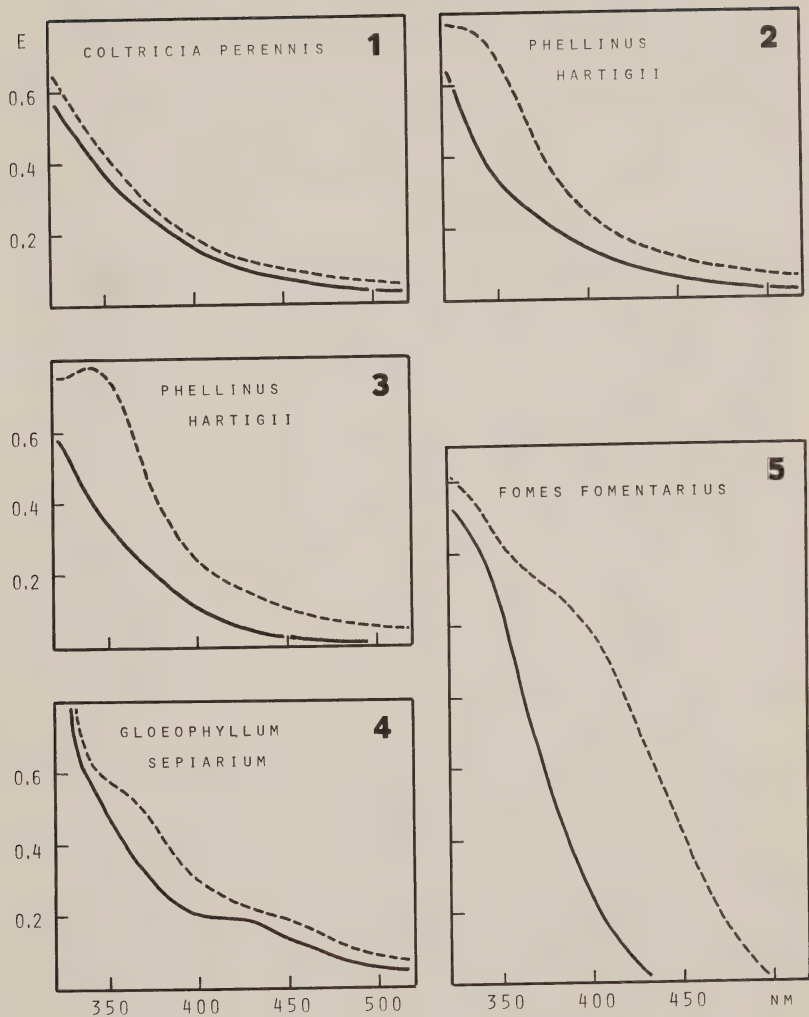
Fomes fomentarius has a steeply descending absorption curve which comes to an end at 430 nm. The curve of the alkalinized extract has a weakly resolved inflexion at about 350 to 390 nm and ends at about 500 nm (Fig. 5).

Gloeophyllum sepiarium has a falling curve with an inflexion at 390 to 430 nm; the curve of the alkalinized extract has inflexions at 365 and near 450 nm (Fig. 4).

G. protractum has a similar but a very long descending absorption curve with an inflexion at 430 nm; the curve of the alkalinized extract has a weak inflexion near 460 nm (Fig. 7).

Gloeoporus dichrous has a long falling curve; the curve of the alkalinized extract is characteristically flexuous with an inflexion at 420 to 450 nm (Fig. 6).

Phaeolus schweinitzii has a distinctive absorption maximum at 355 nm; the maximum of the alkalinized extract is at 380 nm (Fig. 8).



Figs. 1-5. Absorption spectra of aqueous extracts and alkalized aqueous extracts (broken line): 1 - *Coltricia perennis* 3 (diluted 1 : 9); 2 - *Phellinus hartigii* 27; 3 - *Ph. hartigii* 28; 4 - *Gloeophyllum sepiarium* 26 (1 : 1); 5 - *Fomes fomentarius* 52.

Punctularia strigoso-zonata has a long steeply falling absorption curve with an inflexion at 365 to 390 nm and a distinctive inflexion at about 415 nm (Fig. 10).

Pycnoporellus albo-luteus and *P. fulgens* have curves similar to each other; the curve of the alkalinized extract shows less intensive absorption than that of the unalkalinized extract (Fig. 9).

Pyrofomes demidoffii has a descending curve which comes to an end at 410 nm; the curve of the alkalinized extract has an inflexion at 415 nm (Fig. 11).

Absorption Spectra of Ethanol Extracts

The absorption curves of the first group of the species of Hymenochaetaceae are non-specific descending lines without any maxima or minima coming to an end in a region of 500 to 550 (or to 600) nm. The curves of the alkalinized extracts are similar to those of the unalkalinized ones, but exhibit more intensive absorption (*Coltricia perennis*, *Hymenochaete fuliginosa*, *Inonotopsis subiculosa*, *Inonotus radiatus*, *Onnia triqueter*, *Phellinus alni*, *Ph. nigricans* No. 31; see fig. 12). The same type of absorption is also revealed by some brownish or brown non-hymenochaetaceous species (*Amylostereum chailletii*, *Columnocystis abietina*, *Ganoderma applanatum*, *Gloeophyllum abietinum*, *Hydnellum* sp., *Pyrofomes demidoffii*).

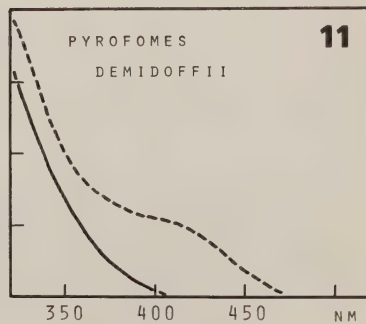
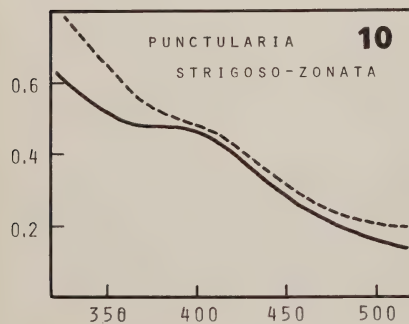
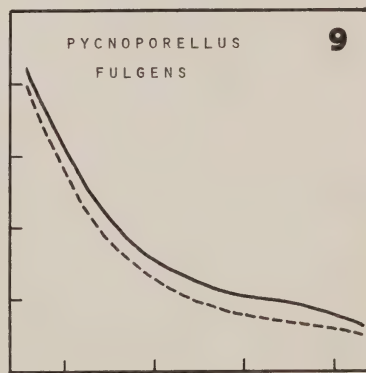
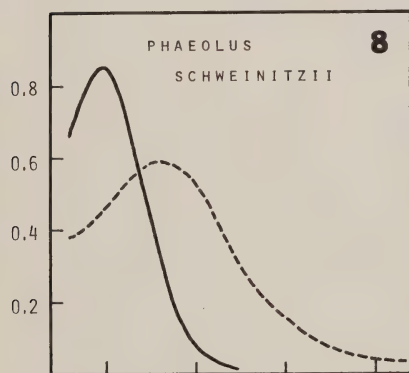
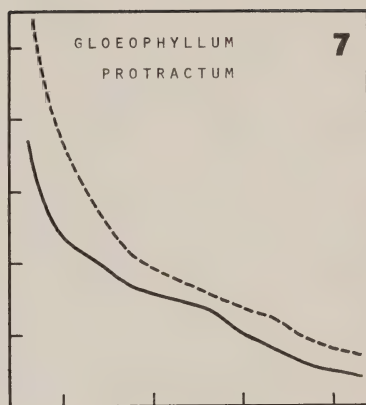
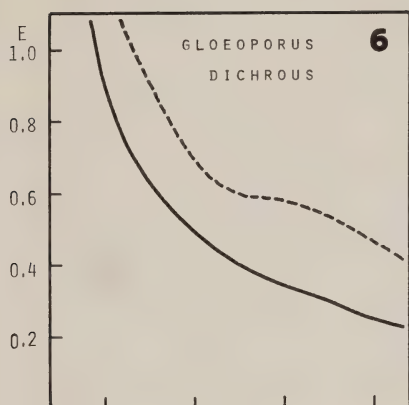
Most of the light-coloured non-hymenochaetaceous fungi have the same type of absorption, but it is usually less intense (*Anurodia sinuosa*, *Cerrena unicolor*, *Climacocystis borealis*, *Coriolus hirsutus*, *Daedalea quercina*, *Dichomitus squalens*, *Diplomitoporus flavescens*, *Irpex lacteus*, *Laetiporus sulphureus*, *Lenzites betulina*, *L. warnieri*, *Polyporus varius* var. *nummularius*, *Trametes cervina*, *T. suaveolens*). Some of them have rather short absorption curves, which come to an end already at 390 to 400 nm (*Lenzites betulina*, *L. warnieri*, *Trametes suaveolens*).

Fomitopsis rosea, *Hirschioporus laricinus*, *H. pargamentus* and *Coriolus pubescens* have similar absorption curves, but the curve of the alkalinized extract is usually nearly identical with that of the unalkalinized extract.

In *Punctularia strigoso-zonata* and *Sarcoporia salmonicolor* the curve of the alkalinized extract exhibits less intensive absorption than that of the unalkalinized extract (Fig. 13).

The absorption curves of the second group of species are similar to those of the first group, but the curve of the alkalinized extract has an inflexion at 345 (to

Figs. 6-11. Absorption spectra of aqueous extracts and alkalinized aqueous extracts (broken line): 6 - *Gloeoporus dichrous* 63; 7 - *Gloeophyllum protractum* 59; 8 - *Phaeolus schweinitzii* 77 (1 : 19); 9 - *Pycnoporellus fulgens* 84; 10 - *Punctularia strigoso-zonata* 79 (1 : 5); 11 - *Pyrofomes demidoffii* 83 (1 : 1).



350) nm. All the fungi of this group are species of Hymenochaetaceae (*Hymenochaete rubiginosa*, *Inonotus dryophilus*, *I. obliquus*, *I. tamaricis*, *I. weirii* No. 16, *Phellinus ferruginosus*, *Ph. hartigii* No. 27, *Ph. microporus*, *Ph. nigrolimitatus*; see Fig. 17). Some other species have instead of the inflexion a maximum at 345 nm (*Asterodon ferruginosus*, *Inonotus cuticularis*, *I. rheades*, *I. weirii* No. 15, *Phellinus ferrugineo-fuscus*, *Ph. hartigii* No. 28, *Ph. nigricans* No. 32; see Fig. 16). One specimen of *Inonotus weirii* (No. 18) has two maxima instead of this maximum, namely at 340 and 355 nm.

The third group of hymenochaetaceous fungi has a distinct maximum (or absorption plateau) of the unalkalized extract in the region of (340 to) 360 to 370 nm; on alkalization the maximum shifts to the 340 to 350 (to 360) nm region, i. e. the curve is similar to the one described in the preceding paragraph (*Phellinus chrysoloma* Nos. 21 and 23, *Ph. pini*, *Ph. pomaceus*, *Inonotus weirii* No. 17; see Fig. 14). The unalkalized extract of *Phellinus chrysoloma* No. 22 has in addition a minimum at 330 nm. *Hymenochaete tabacina* has absorption curves of the same type but with different minima and maxima (unalkalized extract: 335 and 380 nm; alkalized extract: 330 and 350 nm, respectively).

Characteristic absorption curves different from the curves described above are obtained from *Phellinus jezoënsis*, *Polystictus tomentosus*, and several non-hymenochaetaceous species:

Phellinus jezoënsis has an absorption maximum at 372 nm; the maximum shifts to 405 nm in alkalization (Fig. 18).

Polystictus tomentosus has a falling curve with a maximum at 525 nm; the curve of the alkalized extract has a weak inflexion at 340 nm (Fig. 19).

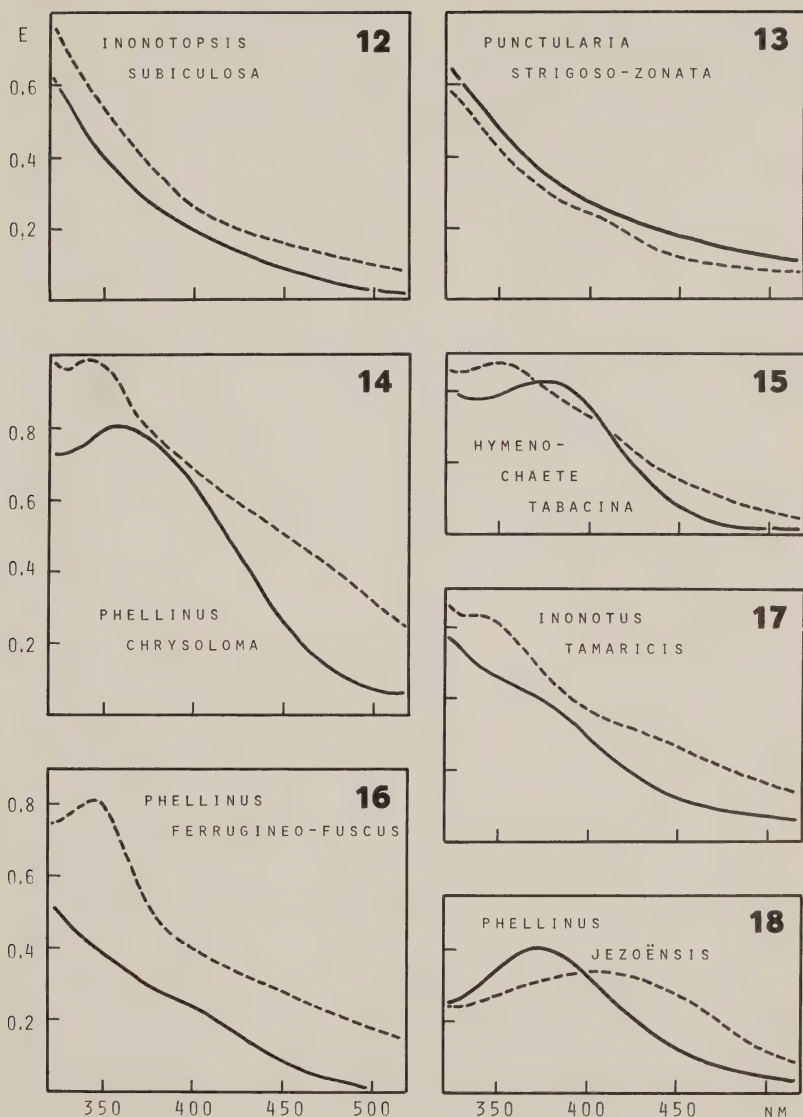
The falling curve of the alkalized extract of *Fomes fomentarius* has an inflexion near 420 nm (Fig. 20).

Gloeophyllum sepiarium has an absorption minimum at 340 to 345 nm, and a maximum at 430 nm; the alkalized extract has a minimum at 400 nm and a maximum at 435 nm (Fig. 21). Another specimen (No. 62) of the same fungus has a falling absorption curve with an inflexion at about 380 nm; the curve of the alkalized extract has an inflexion at 345 nm and an absorption plateau at 410 to 440 nm.

G. protractum has absorption curves similar to those of *G. sepiarium*: specimen No. 58 has a minimum in the region of 390 to 400 nm and a maximum at 435 nm. Another specimen (No. 59) of the same species has a maximum at 405 nm; the alkalized extract has an inflexion at 435 nm (Fig. 22).

Gloeoporus dichrous has a descending absorption curve with an inflexion at 400 nm; the curve of the alkalized extract has a weak inflexion at 460 nm (Fig. 23).

Phaeolus schweinitzii has a curve with an absorption maximum in the region of 360 to 365 nm; on alkalization the maximum shifts to 365 to 370 nm (specimen No. 77,



Figs. 12-18. Absorption spectra of ethanol extracts and alkalinized ethanol extracts (broken line): 12 - *Inonotopsis subiculosa* 7 (1 : 1); 13 - *Punctularia strigoso-zonata* 79 (1 : 3); 14 - *Phellinus chrysoloma* 21 (1 : 1); 15 - *Hymenochaete tabacina* 6; 16 - *Phellinus ferrugineo-fuscus* 25 (1 : 2); 17 - *Inonotus tamaricis* 14 (1 : 1); 18 - *Phellinus jezoënsis* 29 (1 : 29).

Fig. 24) or to 380 to 385 nm (specimen No. 76).

Pycnoporellus albo-luteus (Fig. 25) and *P. fulgens* (Fig. 26) have absorption curves with a clear or almost indistinct minimum in 380 to 400 nm region and a maximum at 450 to 455 nm; on alkalization the minimum shifts to the 415 to 425 (*P. fulgens*) or to the 440 to 450 nm (*P. albo-luteus*) region and the maximum shifts to 505 to 512 nm region.

Tyromyces mollis has a falling absorption curve with an inflexion at 365 nm (Fig. 27).

Absorption spectra of Methanol-HCl Extracts

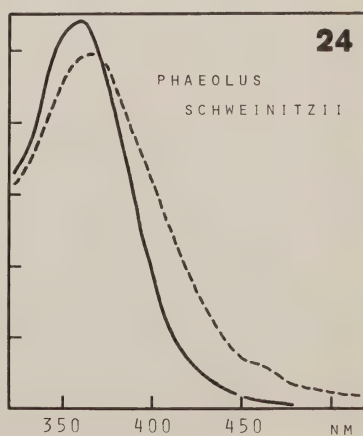
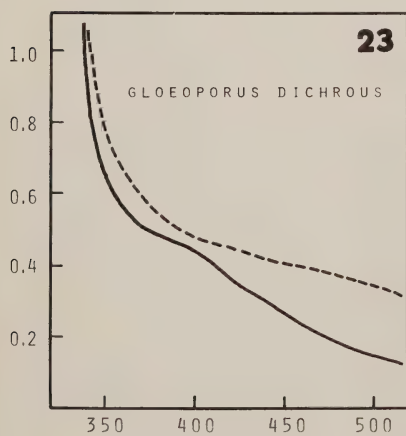
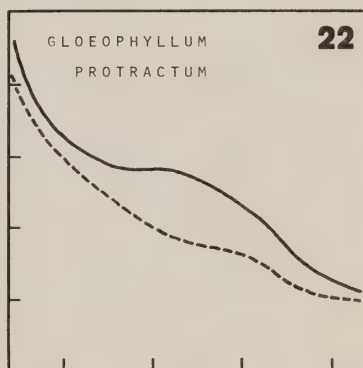
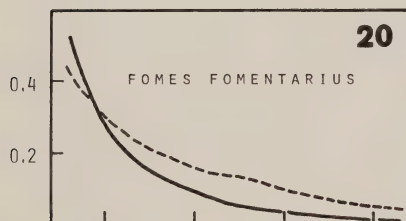
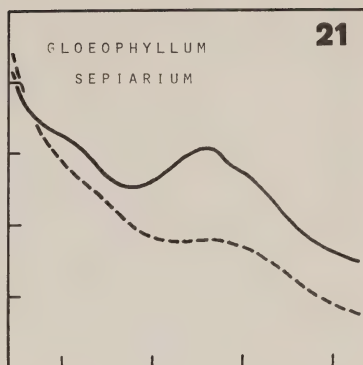
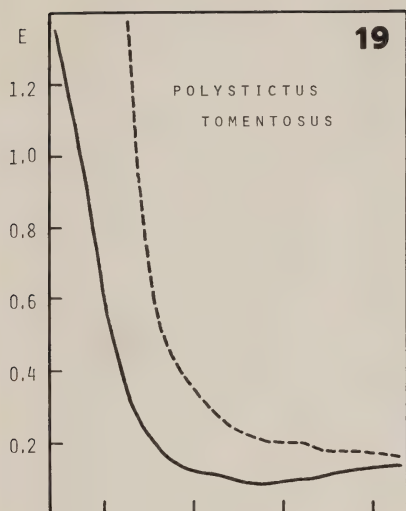
The spectra of the methanol-HCl extracts have much greater specific and individual differences than the spectra of the aqueous and ethanol extracts.

The species of the first group have non-specific falling absorption curves without any clear maxima, minima or inflexions (some Hymenochaetaceae species: *Hymenochaete fuliginosa*, *Phellinus ferruginosus*, and most of the non-hymenochaetaceous fungi studied: *Amylostereum chailletii*, *Antrodia sinuosa*, *Columnocystis abietina*, *Daedalea quercina*, *Fomes fomentarius*, *Fomitopsis rosea*, *Ganoderma applanatum*, *Gloeophyllum abietinum*, *Hydnellum* sp., *Lenzites warnieri*, *Trametes suaveolens* and *Punctularia strigosozonata*).

The second group is made up of Hymenochaetaceae species having a descending absorption curve with a clear or indistinct inflexion in the region of 360 to 380 or to 390 nm, sometimes even an almost horizontal absorption plateau in the region of 350 to 390 nm (*Asterodon ferruginosus*, *Coltricia perennis*, *Hymenochaete rubiginosa*, *Inonotopsis subiculosa*, *Inonotus cuticularis*, *I. dryophilus*, *I. radiatus*, *I. weirii* Nos. 15 and 16, *Phellinus chrysoloma* No. 23, *Ph. ferrugineo-fuscus*, *Ph. nigrolimitatus*, *Ph. pini*, and the non-hymenochaetaceous fungus *Lenzites betulina*). The exact position of the inflexion or plateau is variable in various species and specimens. For example, *Inonotus weirii* No. 16 has a plateau from 340 to 375 nm, No. 15 from 360 to 370 nm, Nos. 17 and 18 belong to the fourth and fifth groups of the species described below.

The absorption curve of the third group of Hymenochaetaceae species has the short wavelength region to 380 (to 390) nm in the form of a nearly horizontal plateau; after this point the curve falls (*Phellinus pilatii*, Fig. 28 C; *Ph. alni*; *Ph. chrysoloma* No. 21, Fig. 28 B). Some other species have in the middle of the

Figs. 19-24. Absorption spectra of ethanol extracts and alkalized ethanol extracts (broken line): 19 - *Polystictus tomentosus* 38; 20 - *Fomes fomentarius* 52; 21 - *Gloeophyllum sepiarium* 60 (1 : 5); 22 - *G. protractum* 59 (1 : 5); 23 - *Gloeoporus dichrous* 63; 24 - *Phaeolus schweinitzii* 77 (1 : 4).



plateau a weak minimum at 370 nm (*Phellinus nigricans* No. 31) or at 375 nm (*Inonotus obliquus*; *I. tamaricis*, see Fig. 28 A; *Phellinus hartigii* No. 28), or a weak minimum at 370 nm and a weak maximum at 380 nm (*Inonotus weirii* No. 18), or several weakly resolved bands (*Inonotus rheades*).

The fourth group of Hymenochaetaceae species has an absorption curve with a maximum at 370 nm (*Phellinus pomaceus*, Fig. 29 B; *Ph. jesoënsis*), at 380 nm (*Ph. nigricans* No. 32) or an absorption band (plateau) at 370 to 380 nm (*Ph. chrysoloma* No. 22) or at 355 to 380 nm with a weak minimum at 375 nm (*Inonotus weirii* No. 17).

The fifth group of Hymenochaetaceae species has a sigmoid absorption curve with a minimum at 330 to 340 nm and a peak or band (plateau) in the region of 355 to 380 nm: *Hymenochaete tabacina* (min. at 330 nm, max. at 370 nm), *Phellinus microporus* and *Inonotus radiatus* (min. at 335 nm, plateau at 365 to 380 nm; see Fig. 29 A), *Phellinus hartigii* No. 27 (min. at 340 nm, plateau at 355 to 365 nm), *Polystictus tomentosus* (min. at 340 nm, max. at 370 nm), *Inonotus weirii* No. 18 (min. at 370 nm, max. at 380 nm).

Some non-hymenochaetaceous species have characteristic absorption curves different from those described above:

Gloeophyllum sepiarium has a sigmoid absorption curve with a minimum at 355 nm and a peak at 415 nm (Fig. 30 A).

G. protractum has an absorption curve which is somewhat similar to the one of *G. sepiarium*; see Fig. 30 C.

Phaeolus schweinitzii has a curve with a peak at 367 nm (Fig. 29 C).

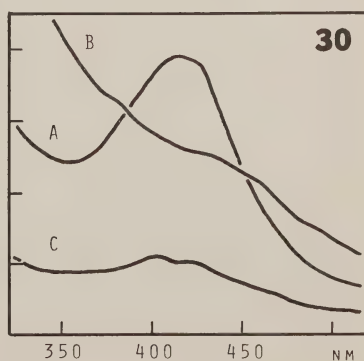
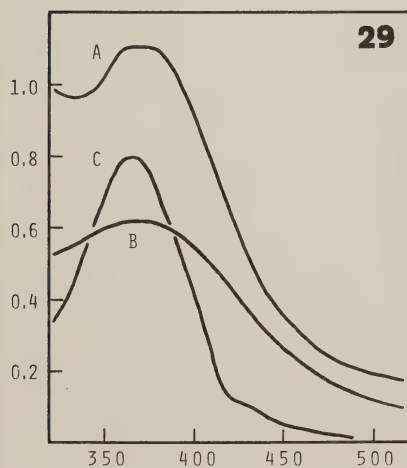
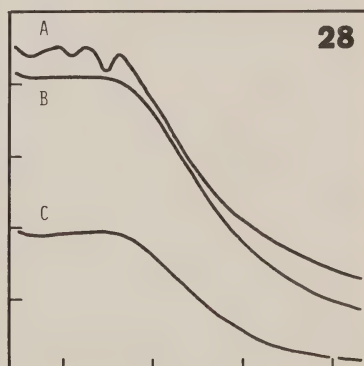
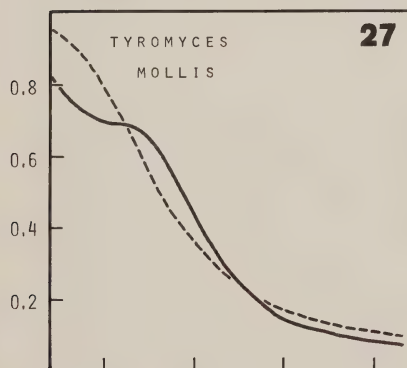
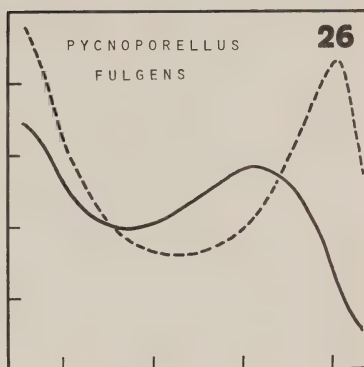
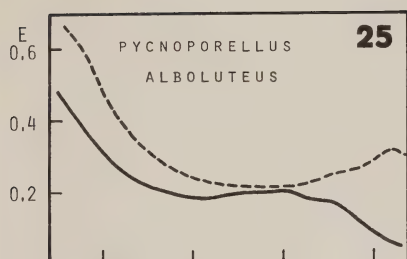
Pyrofomes demidoffii has a falling, somewhat flexuous absorption curve (Fig. 30 B).

DISCUSSION

Are there any species of Hymenochaetaceae with a negative xanthochroic reaction? Is the reaction exclusively characteristic of the hymenochaetaceous fungi, or is it

Figs. 25-27. Absorption spectra of ethanol extracts and alkalized ethanol extracts (broken line): 25 - *Pycnoporellus albo-luteus* 80 (1 : 1); 26 - *P. fulgens* 84 (1 : 1); 27 - *Tyromyces mollis* 92 (1 : 10).

Figs. 28-30. Absorption spectra of methanol-HCl extracts: 28 A - *Inonotus tamaricis* 14 (1 : 5), 28 B - *Phellinus chrysoloma* 21 (1 : 3), 28 C - *Ph. pilatii* 34 (1 : 10); 29 A - *Inonotus radiatus* 11 (1 : 3), 29 B - *Phellinus pomaceus* 37 (1 : 3), 29 C - *Phaeolus schweinitzii* 76 (1 : 35); 30 A - *Gloeophyllum sepiarium* 61 (1 : 3), 30 B - *Pyrofomes demidoffii* 87 (1 : 3), 30 C - *Gloeophyllum protractum* 59 (1 : 10).



more widespread? In the descriptions of the family Hymenochaetaceae s. l. the xanthochroic reaction (positive KOH test) is indicated as common to the family as a whole. However, there are some genera (*Phaeolus*, *Pycnoporellus*) which some authors include under the Hymenochaetaceae and others exclude; consequently, the xanthochroic character of at least these genera is disputable. Pegler (1973: 401) asserts that the context of Polyporaceae species is never xanthochroic; on the other hand Jahn (1963: 91) states that the KOH test is positive in the majority of non-hymenochaetaceous pore fungi having a brown context (e. g., in *Ganoderma* species, *Fomes*, *Osmoporus*, *Gloeophyllum*). In 1975 he even wrote that all polypores having a brown context blacken when treated with KOH (though some of them restore their colour afterwards).

Jacquenoud (1974) has written a special paper on some species of non-hymenochaetaceous Polyporaceae with a context darkening when treated with KOH solution. He pointed out that the herbarium specimens of *Lenzites betulina* and *Coriolus versicolor* collected long ago may display a positive KOH test; this is also the case with some parts of the recently collected basidiocarps of *Ganoderma applanatum*, *Gloeophyllum trabeum* and *Pycnoporus cinnabarinus*. The papers of Bataille (1912), Overholts (1953), Jahn (1963, 1967, 1975), Lowe (1966), Domański & Orlicz (1967) and Ryvarden (1976) carry evidence of the occurrence of the positive KOH test (darkening of the whole basidiocarp or some part of it) also in *Daedalea quercina*, *D. farinacea* (Fr.) Overh., *Fomes expansus* (Desm.) Domański & Orlicz, *F. fomentarius*, *Funalia trogii* (Berk.) Bond. & Sing., *Trametes* (= *Funalia*?) *hispida* Bagl., *Ganoderma applanatum*, *G. curtisii* (Berk.) Murrill, *Gloeophyllum abietinum*, *G. sepiarium*, *Melanoporia nigra* (Berk.) Murrill, *Phaeolus schweinitzii*, *Polyporus modestus* Kunze, *P. supinus* Fr., *P. persicinus* Berk. & Curt. and *Poria carbonacea* (Berk. & Curt.) Cooke.

Pegler (1973: 408) asserted that the context of *Pyro-*

fomes and *Nigroporus* changes into blackish with alkali, but the discoloration is not permanent. *Fomes* is placed by him in a group of the genera with a "context not noticeably darkening with alkali" (p. 408-409).

As it is seen from Table 1, all the species of the Hymenochaetaceae studied are really xanthochroic; this is true of both aqueous extracts and ethanol extracts. Moreover, the extinction of an alkalized extract is higher than of an unalkalized one over the whole range of the absorption curve, i. e. at all wavelengths (see Figs. 1, 2, 3, 12, 14, 16, 17, 19). However, there are some slight deviations (*Hymenochaete tabacina*, Fig. 15; *Phellinus ferruginosus*; *Ph. jezoënsis*, Fig. 18; *Ph. hartigii* No. 27 in Table 1).

The extinction *E*, which reflects the darkness and the amount of the soluble pigment in the extract varies greatly in different species and for different basidiocarps of the same species. In some species (*Coltricia perennis*, *Asterodon ferruginosus*, *Phellinus pomaceus*, *Ph. alni*, *Ph. hartigii*, *Onnia triqueter*, some specimens of *Inonotus radiatus*, *Phellinus chrysoloma*, *Ph. nigricans* and *Ph. pini*) the extracts are quite light-coloured. In the extracts of annual basidiocarps of *Inonotus* species the average extinction is nearly twice as high as in the extracts of the perennial basidiocarps of *Phellinus* species. If the pigments of these genera are closely related, the observed difference in extinction may be explained by the polymerization of the pigment in course of time.

The pigments soluble in water and ethanol seem to be somewhat different in some species. For example, in most cases (but not always) the ethanol extract is much lighter than the aqueous extract in the *Inonotus* species, but vice versa in most of the *Phellinus* species.

The darkening of the extract on alkalization does not vary less than the intensity of extinction. The xanthochroic reaction (see *x* in Table 1) may be quite weak in *Phellinus ferruginosus*, *Ph. pilatii* as well as in some

specimens of *Inonotus weirii* a. o., while it may be very intensive in some specimens of *Phellinus chrysoloma*, *Ph. hartigii*, *Ph. pini* and in other specimens of *Inonotus weirii*. The degree of darkening of the ethanol extract is frequently different from that of the aqueous extract.

All of these observations seem to agree with the supposition that the pigments of the Hymenochaetaceae species are complexes of an uncertain composition.

Among the brown-coloured species of families other than the Hymenochaetaceae there are some with a distinct xanthochroic reaction: *Columnocystis abietina*, *Amylostereum chailletii* (Stereaceae), *Ganoderma applanatum* (Ganodermataceae), *Gloeophyllum abietinum*, *Phaeolus schweinitzii*, *Fomitopsis scutellata*, *Fomes fomentarius*, *Pyrofomes demidoffii* (Polyporaceae). The aqueous extract of *Punctularia strigoso-zonata* (Punctulariaceae), *Gloeophyllum protractum* and *G. sepiarium* (Polyporaceae) darkens on alkalization, while the ethanol extract becomes more light-coloured in the same species; these species may not be considered xanthochroic in the strict sense of the term.

The yellowish or brownish aqueous and ethanol extracts may be obtained not only from brown-coloured, but also from light-coloured basidiocarps of various Aphyllophoraceous fungi. As is seen from Table 2, the aqueous extract of many species is not less coloured than that of certain hymenochaetaceous fungi (*Lenzites betulina*, *Irpez lacteus*, *Hirschioporus laricinus*, *Gloeoporus dichrous*, *Trametes cervina* of Polyporaceae; *Polyporus varius* of Polyporaceae s. str., a.o.). In most of these species the extract darkens on alkalization considerably, i. e. it displays the xanthochroic reaction. The reason why the positive KOH test is not mentioned concerning the majority of these species earlier, lies obviously not in the low darkening index (x), but in the relatively small amount of the dark pigment in basidiocarps.

The xanthochroic reaction is characteristic of many white rot fungi (all the species of Hymenochaetaceae, *Ganoderma applanatum*, *Fomes fomentarius*, many of the species with light-coloured basidiocarps mentioned in Table 2), but it occurs also in some brown rot fungi (*Phaeolus schweinitzii*, *Gloeophyllum abietinum*, *Fomitopsis rosea*, *Laetiporus sulphureus*, *Daedalea quercina*). Consequently,

the darkening of a pigment complex in alkalization does not always demonstrate the origin of these pigments from lignin breakdown products.

Many species have non-specific steeply falling absorption curves without any maxima, minima or inflexions. Other species have some common features, especially in the character of absorption of alkalized extracts.

The absorption curves of alkalized aqueous extracts exhibit the presence of compounds with intensive absorption in the 335 to 350 nm region; alkalized ethanol extracts indicate the presence of such compounds in the 340 to 350 (to 360) nm region. In some species the amount of these compounds is low, in other species rather high. None of the non-hymenochaetaceous species exhibits absorption of the same type.

Several Hymenochaetaceae species have absorption curves of unalkalized ethanol extracts with a maximum or an absorption plateau in the (340 to) 360 to 370 (to 380) nm region; these are the species of the *Phellinus pini* complex, but also some others (*Hymenochaete tabacina*, *Inonotus weirii*). Such absorption may be due to the compounds related to hispidin; the analogues of hispidin have $\lambda_{\max}$ 347 to 379 (to 395) nm (Edwards & Mir, 1967).

Most of the Hymenochaetaceae species have absorption curves of the methanol-HCl extract with a maximum absorption in the 340 to 390 nm region. There are usually several weakly resolved bands in this region. Such absorption is characteristic of the Hymenochaetaceae, but also of *Phaeolus schweinitzii* (which has a maximum at 367 nm); it may be due (at least in part) to the compounds related to hispidin and hypholomines (cf. Fiasson, Gluchoff-Fiasson & Steglich, 1977: 1048).

There are no specific features of the absorption curves characteristic of certain genera or a certain group of the Hymenochaetaceae. The only exception is the *Phellinus pini* group (*Ph. pini*, *Ph. chrysoloma*, *Ph. microporus*); the absorption spectra of (unalkalized and alkalized) ethanol extracts show that these species are somewhat different from the majority of the other *Phellinus* species and may be related to *Ph. pomaceus* and *Inonotus weirii*. The same is true of the UV-spectra of these species (authors' unpublished data).

A number of species of fungi having brown or brownish basidiocarps contain pigments of a specific character and exhibit absorption spectra different from the typical Hymenochaetaceae species. These are *Fomes fomentarius*, *Gloeophyllum protractum*, *G. sepiarium*, *Gloeoporus dichrous*, *Phaeolus schweinitzii*, *Pycnoporellus albo-luteus*,

Pycnoporellus fulgens, *Pyrofomes demidoffii*, *Sarcoporia salmonicolor*, *Tyromyces mollis* (Polyporaceae) and *Punctularia strigoso-zonata* (Punctulariaceae). Some of them are regarded by several authors as fungi belonging to the family Hymenochaetaceae, but they must be excluded (*Phaeolus*, *Pycnoporellus*, *Pyrofomes*).

Phaeolus Pat. emend. Bond. & Sing. has been referred to the same group as the genera *Phellinus*, *Inonotus*, *Coltricia*, i. e. Hymenochaetaceae (or Mucronoporaceae/Mucronoporeae) by Imazeki (1943), Kühner (1950; cited by David, 1969), Ito (1955), Donk (1964), Kreisel (1961), Veselý, Kotlaba & Pouzar (1972), Pegler (1973, 1973a), Niemelä (questionably, 1976) and Ryvarden (1976 non 1978). However, already Patouillard (1900) had separated this genus from his *Série des Igniaries*. In 1963 Kotlaba and Pouzar asserted that "the genera *Pycnoporellus* and *Phaeolus* occupy position between the families Hymenochaetaceae and the Poriaceae (Polyporaceae excluding Polyporus)". The sterile element of the hymenium of *Ph. schweinitzii* was called by them *pseudosetae*. Nobles (1971) demonstrated that this species differs from species of the Hymenochaetaceae by its cultural characters. Unlike Hymenochaetaceae, it causes brown rot of wood. The peculiarities of the absorption spectra of the aqueous and ethanol extracts confirm the difference of this species from the Hymenochaetaceae.

Pycnoporellus Murrill emend. Kotl. & Pouz. is said to be intermediate between the Hymenochaetaceae and the Poriaceae (Kotlaba & Pouzar, 1963: 176, 185); Pegler (1973, 1973a) included it in the Hymenochaetaceae. This seems to be unfounded: *P. fulgens* and *P. albo-luteus* are responsible for brown rot of wood; setae are absent; the context turns purple when treated with KOH and not brown or black. As described above, the aqueous extracts of the basidiocarps of these species do not darken when alkalinized; the ethanol extract exhibits specific absorption, different from the absorption of the Hymenochaetaceae species.

Phellinus demidoffii (Lév.) Bond. & Sing. was transferred by Kotlaba and Pouzar to the family Polyporaceae in 1964 and was named *Pyrofomes demidoffii*; this was based on the presence of clamps on generative hyphae and an unusual reddish-orange colour of the trama of this species. This standpoint was supported by Domański, Orłowski & Skirgiełło (1967) and Pegler (1973). Nobles (1971) pointed out the peculiarity of the cultural characters of the species. The absorption spectra of *P. demidoffii* are not very characteristic, but at any rate they are not typical of the Hymenochaetaceae.

The absorption curves of the extracts of the *Gloeophyllum* species are worth noting. The similarity of those in *G. protractum* and *G. sepiarium* shows that the species of *Osmoporus* and *G. sepiarium* are really congeneric, as shown by Imazeki (1943), Besl, Bresinsky & Kronawitter (1975) and David & Fiasson (1977); the similarity is obviously due to the presence of trametine. On the other

hand, the pigment of *G. abietinum* is clearly different from the pigments of *G. protractum* and *G. sepiarium*, as was demonstrated already by Besl, Bresinsky & Kronawitter (1975), and David & Fiasson (1977: 313).

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81, 85-92.

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ETUDE SUR LES CHAMPIGNONS PARASITES DU SUD-EST ASIATIQUE. 34. UN NOUVEAU GENRE, CYLINDROCLADIOPSIS (MONILIACÉE), PROVOQUANT UNE MALADIE DE TACHES FOLIAIRES DU LAGERSTRAEMIA EN MALAISIE

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ABSTRACT

This study deals with a new species of plant pathogenic fungi which causes a leaf spot disease of *Lagerstraemia* in Malaysia, *Cylindrocladiopsis lagerstraemiae* Yen, sp. nov. et gen. nov.

En étudiant des échantillons récoltés par nous-même en Malaisie 1971, nous avons trouvé une maladie de taches foliaires du *Lagerstraemia*, provoquée par un nouveau champignon: *Cylindrocladiopsis lagerstraemiae* Yen, sp. nov. et gen. nov.

Description du champignon

Sur les feuilles du *Lagerstraemia flos-reginae* (Lythracée), à Kuala Lumpur (For. Res. Inst.), Malaisie, leg. Jo-min Yen (No. 71345), 28 sept. 1971.

Macules orbiculaires ou suborbiculaires, brun clair, à bords flous, isolées, dispersées, 2-15 mm de diamètre, parfois confluentes.

Hyphes externes peu développées, hyalines, cloisonnées, ramifiées, 3-4 μm de diamètre. Fructifications hypogènes, invisibles à l'oeil nu, même à la loupe.

Conidiophores hypophylles, généralement sortant par l'ostiole des stomates, solitaires, parfois groupés en fascicules de 2-3 individus, simples à la base, mais 2-4 fois bifurqués en haut, hyalins, cylindriques, érigés, à apex tronqué ou subtronqué après la chute des conidies; parties basales de conidiophores cylindriques, 0-5 cloisonnées, mesurant 40-70 $\times$ 5-6.5 μm ; rameaux dichotomes cylindriques, non cloisonnés, de longueur très variée, mesurant 5-22 $\times$ 3-4 μm (FIG. 1, 4, 5 et 6); cellules conidiogènes terminales, produisant à leur extrémité un seul bourgeon évoluant en une conidie cylindrique de diamètre plus grand, séparée bientôt du rameau porteur par une cloison transversale (FIG. 5 et 6); cicatrices d'insertion des conidies indistinctes.

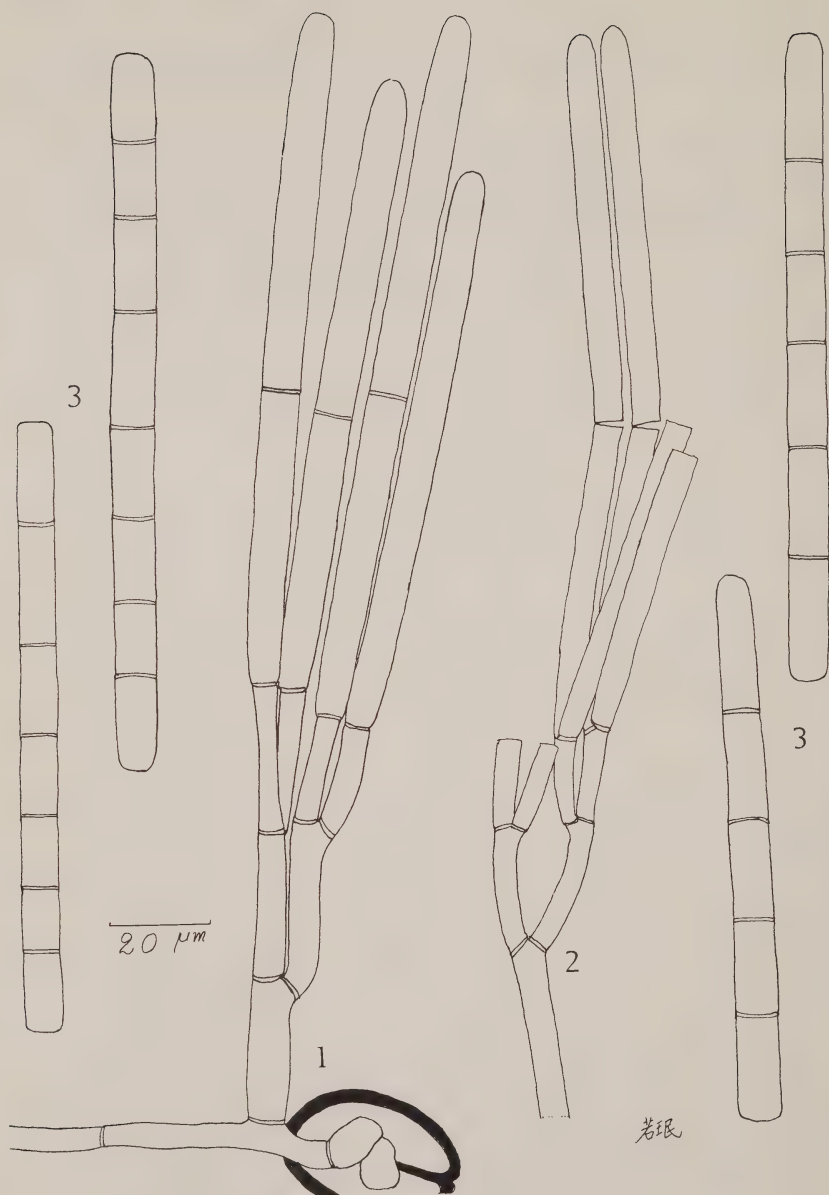


FIG. 1-3, *Cy lindrocladiopsis lagerstraemiae* Yen: 1, Conidio-
phore à deux fois bifurqués; 2, Parties supérieures de jeunes
conidies se détachant; 3, Conidies bien divisées.

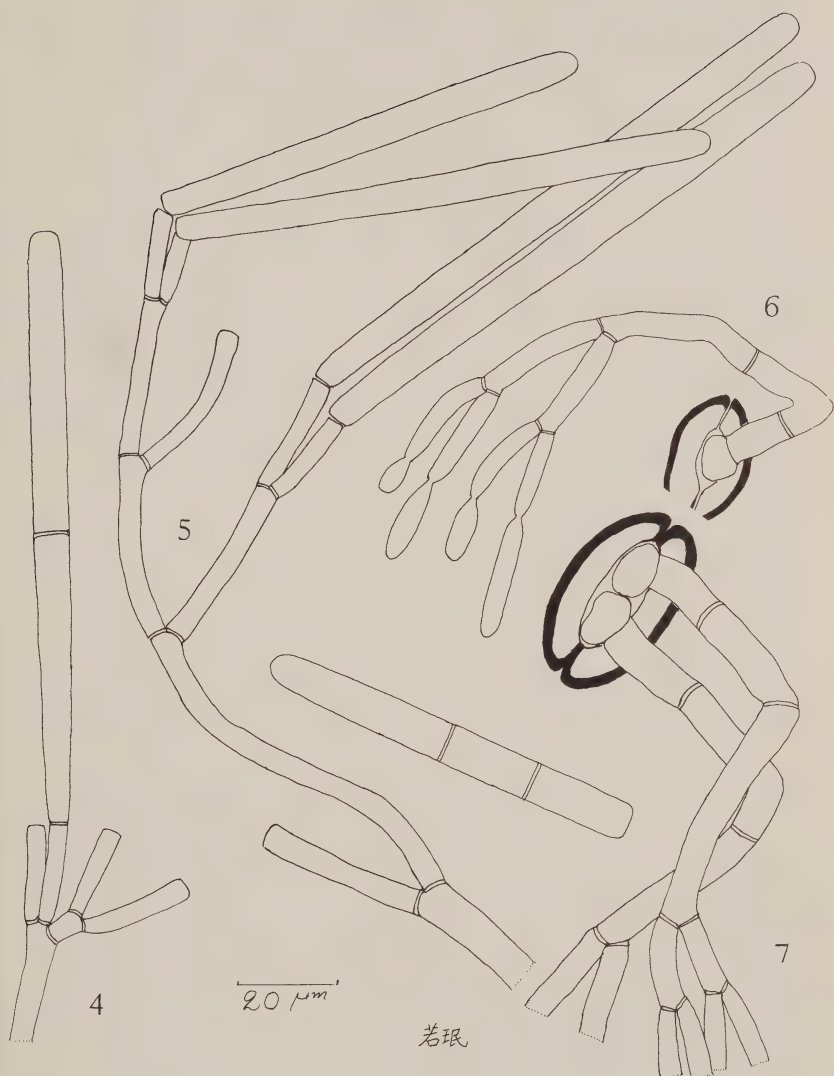


FIG. 4-7, *Cyliandrocladiopsis lagerstraemiae* Yen: 4, Rameaux conidiophères à longueurs variées; 5, Conidiophore à 4 fois bifurqués; 6, Formation de conidies; 7, Fascicule de 2 conidiophores.

Conidies cylindriques, hyalines, toujours droites, divisées progressivement par 1-7 cloisons transversales, arrondies aux deux extrémités, mesurant $45-103 \times 6-8 \mu\text{m}$ (FIG. 3); jeunes conidies encore attachées sur les rameaux conidiogènes, parfois s'articulant en deux au niveau de la première cloison et la partie supérieure se désarticulant facilement en forme d'arthroconidies (FIG. 2).

Caractères taxinomiques

Microscopiquement notre récolte montre une grande ressemblance avec le genre *Cylindrocladium*. Cependant, d'après Boedijn & Reitsma (1950), Booth & Murray (1960), Sobers & Seymour (1967) et Morrison & French (1969), toutes les espèces de *Cylindrocladium* présentent constamment des phialides généralement doliformes et de longs stipes cloisonnés et couronnés d'une vésicule globuleuse ou ovoïde. Par contre, notre champignon possède ni phialides, ni longs stipes, mais seulement des rameaux conidiogènes monoblastiques. Par conséquent, ce champignon malaisien peut être considéré non seulement comme une espèce nouvelle, mais aussi le type d'un nouveau genre que nous proposons, avec la diagnose suivante:

CYLINDROCLADIOPSIS Yen, *gen. nov.*

Hyphes externes hyalines, sortant par l'ostiole des stomates, circulant sur la face inférieure de la feuille, cloisonnées et ramifiées. Conidiophores hypogènes, hyalins, sortant d'une ostiole des stomates, solitaires ou en fascicules, droits, simples et cloisonnés en bas, bifurqués en haut, rameaux conidiogènes continus, monoblastiques et produisant à leur extrémité une seule conidie blastique cylindrique, cicatrices d'insertion des conidies indistinctes. Conidies cylindriques, hyalines, droites, cloisonnées, arrondies aux deux extrémités.

Hyphis sterilibus repentibus, ex stomatibus oriundis, hyalinis, septatis, ramosis. Conidiophoris hypophyllis, solitariis vel fasciculatis, ex stomatibus oriundis, hyalinis, erectis, inferne simplicibus et septatis, superne dichotome ramosis, ramis cylindraceis, non septatis, producentibus unum conidium blastice et terminale. Conidiis cylindraceis, hyalinis, rectis, 1-7 septatis, utrinque rotundatis. Species typica: *Cylindrocladiopsis lagerstraeemiae* Yen.

CYLINDROCLADIOPSIS LAGERSTRAEMIAE Yen, *sp. nov.*

Maculis orbicularis vel suborbicularis, pallide brunneis, dispersis vel leviter confluentibus, 2-15 mm diam. Hyphis sterilibus leviter repentibus, ex stomatibus oriundis, hyalinis, septatis, ramosis, 3-4 μm crassis. Conidiophoris hypophyllis, ex stomatibus oriundis, erectis, solitariis, raro 2-3 fasciculatis, inferne cylindraceis, simplicibus, 0-5 septatis, 40-70 $\times$ 5-6.5 μm , supra 2-4 dichotome furcatis, ramis cylindraceis, non septatis, producentibus unum conidium blastice et terminale, 5-22 $\times$ 3-4 μm . Conidiis cylindraceis, hyalinis, rectis, 1-7 septatis, utrinque rotundatis, 45-103 $\times$ 6-8 μm , saepe ad septum primum desarticulatis et in partibus descendibus.

Habitat in foliis vivis *Lagerstraemiae flos-reginae*, Kuala Lumpur (For. Res. Inst.), Malaysia, ad Jo-min Yen (No. 71345), 28 Sept. 1971. Typus: in Herb. Jo-min Yen, No. 71345 (isotypus in Herb. G. L. Hennebert, No. 20465).

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MYCOTAXON

Vol. VIII, No. 1, p. 238

January-March 1979

N O T I C E

THIRD INTERNATIONAL MYCOLOGICAL CONGRESS

The Executive Committee of the International Mycological Association has accepted the invitation of the Mycological Society of Japan to hold the Third International Mycological Congress (IMC₃) in Japan in 1983. The Congress will be based at either Kyoto or Tokyo, most probably in late August.

Further information will be circulated by the Organizing Committee of the Congress when detailed arrangements have been finalized.

D. L. Hawksworth
Secretary, IMA

CMI, Kew
September, 1978

MYCOTAXON

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CONTRIBUTION TO THE LICHEN FLORA OF ARGENTINA

XI. Lichens from Cabo San Antonio, Buenos Aires Province

HECTOR S. OSORIO¹ and FELICIA R. D'ESPOSITO²

Summary

Twenty-nine lichens collected in San Antonio Cape, Buenos Aires Province, are enumerated. *Buellia callispora* and *Pseudoparmelia exornata* are added to the known flora of Argentina. The finding of *Parmotrema andinum* and *P. delicatulum* represents a noteworthy extension of their distribution in the country.

Recently the junior author collected some lichens in the San Antonio Cape area, situated in Buenos Aires Province, the most easterly of the Argentine Atlantic coast. Four localities on the oceanic coast were visited (from north to south): San Clemente de Tuyú, Las Toninas, La Lucila, and Punta Médanos, between 36° 20' and 36° 50' south. Some of the species identified are new to the lichen flora of Argentina whereas others enlarge their distribution area considerably. This has encouraged the authors to publish the results.

All of the specimens cited are deposited in the Herbarium of the Museo Nacional de Historia Natural, Montevideo, Uruguay (MVM), and duplicates of those identified with the abbreviation CIBIMA are preserved in the Herbarium of the Centro de Biología Marina, Buenos Aires, Argentina.

Anaptychia obscurata (Nyl.) Vain.

LAS TONINAS: Bark of *Salix* (CIBIMA 20770.a.).

Bacidia megapotamica Malme

SAN CLEMENTE DE TUYU: On bark (MVM 17843).

Buellia callispora (Knight) Stein.

LA LUCILA: On wooden post (MVM 17740); on wooden fence post, *Pinus* forest (MVM 17741); bark of tree (MVM 17826).

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PUNTA MEDANOS: On wooden post on the beach (MVM 17827). New to Argentina.

Buellia subisabellina Zahlbr.

SAN CLEMENTE DE TUYU: Bark of tree (MVM 17755, 17756).

Caloplaca erythrantha (Tuck.) Zahlbr.

SAN CLEMENTE DE TUYU: Bark of tree (CIBIMA 20836, MVM 17835, 17837.b.). LAS TONINAS: Bark of *Salix* (CIBIMA 20767, MVM 17840). LA LUCILA: On wooden fence post, *Pinus* forest (CIBIMA 20751, MVM 17743, 17847). PUNTA MEDANOS: On wooden fence post on the beach (CIBIMA 20848, MVM 17849).

Caloplaca xanthraspis (Kremp.) Magn.

SAN CLEMENTE DE TUYU: Bark of tree (MVM 17831.b., 17837.b.). LAS TONINAS: Bark of *Salix* (CIBIMA 20766).

Candelaria fibrosa (Fr.) Müll. Arg.

LAS TONINAS: Bark of *Salix* (MVM 17757).

Dirinaria confluens (Fr.) Awasthi

LA LUCILA: On wooden fence post, *Pinus* forest (MVM 17839).

Considering as a basis the distribution indicated by Awasthi (1975) this is the first record of the genus *Dirinaria* south of parallel 36 and consequently the southernmost one known at present. The excellent development of the samples we collected leads us to believe that the range ought to extend even farther south in Buenos Aires Province.

Graphis pavoniana Fée

SAN CLEMENTE DE TUYU: Bark of tree (MVM 17841.d.).

Graphis scripta (L.) Ach.

SAN CLEMENTE DE TUYU: Bark of tree (MVM 17841.c.).

Parmelia borrierioides Nyl.

LAS TONINAS: Bark of *Salix* (CIBIMA 20765, 20770.c.). LA LUCILA: On wooden post (CIBIMA 20756).

Parmelia microsticta Müll. Arg.

LAS TONINAS: Bark of *Salix* (CIBIMA 20764). LA LUCILA: Wooden fence post, *Pinus* forest (MVM 17842). PUNTA MEDANOS: Wooden fence post on the beach (CIBIMA 20850).

Parmotrema andinum (Müll. Arg.) Hale

LA LUCILA: On wooden fence post, *Pinus* forest (MVM 17742). The present find represents a significant extension of the distribution

because it was formerly known from Salta in northern Argentina (Hale 1965).

Parmotrema austrosinense (Zahlbr.) Hale

SAN CLEMENTE DE TUYU: On wooden fence post (MVM 17838). LA LUCILA: Wooden fence post, *Pinus* forest (CIBIMA 20754, MVM 17744, 17824).

Parmotrema delicatulum (Vain.) Hale

LA LUCILA: On wooden fence post (CIBIMA 20760 pr.p.). This is another unexpected find since it was previously reported from Misiones (Osorio 1970) and from north of Corrientes (Osorio and Ferraro, unpublished record).

Parmotrema reticulatum (Tayl.) Choisy

LAS TONINAS: Bark of *Salix* (CIBIMA 20770.b.). LA LUCILA: On wooden fence post, *Pinus* forest (CIBIMA 20753 pr.p., MVM 17749.b., 17846).

Parmotrema uruguense (Kremp.) Hale

LA LUCILA: On wooden fence post, *Pinus* forest (CIBIMA 20845). PUNTA MEDANOS: Wooden fence post on the beach (MVM 17828).

Pertusaria megapotamica Magn.

SAN CLEMENTE DE TUYU: On bark (MVM 17831.a.).

Phaeographina arechavaletae Mull. Arg.

SAN CLEMENTE DE TUYU: Bark of tree (MVM 17841.a and b.).

Physcia alba (Fée) Müll. Arg. var. *obsessa* (Mont.) Lynge

LAS TONINAS: Bark of *Salix* (CIBIMA 20769).

Physcia syncolla Tuck.

SAN CLEMENTE DE TUYU: Bark of *Cedrus* (MVM 17833, 17834). LAS TONINAS: Bark of *Salix* (CIBIMA 20768).

Pseudoparmelia exornata (Zahlbr.) Hale

LA LUCILA: On wooden fence post (CIBIMA 20760 pr. p.); bark of tree (MVM 17844); on wooden fence post, *Pinus* forest (CIBIMA 20752). New to Argentina.

Pseudoparmelia texana (Tuck.) Zahlbr.

LA LUCILA: On wooden fence post, *Pinus* forest (CIBIMA 20753 pr.p., MVM 17749.c.).

Ramalina celastri (Spreng.) Krog and Swinscow

SAN CLEMENTE DE TUYU: Wooden fence post (CIBIMA 20834). LAS TONINAS: Bark of *Salix* (CIBIMA 20762). LA LUCILA: Wooden fence post, *Pinus* forest (CIBIMA 20749, MVM 17821, 17825).

Ramalina complanata (Sw.) Ach.

LA LUCILA: Wooden fence post (CIBIMA 20758).

Rinodina inseparata (Nyl.) Malme

SAN CLEMENTE DE TUYU: Bark of shrubs (CIBIMA 20835). LA LUCILA: Bark of tree (MVM 17819).

Teloschistes chrysophthalmus (L.) Th. Fr. var. *cinereus* Mull. Arg.

SAN CLEMENTE DE TUYU: Wooden fence post (MVM 17836). LAS TONINAS: Bark of *Salix* (CIBIMA 20763). LA LUCILA: Wooden fence post, *Pinus* forest (MVM 17845). PUNTA MEDANOS: Wooden fence post (MVM 17848).

Usnea sulcata Motyka

LA LUCILA: Wooden fence post (CIBIMA 20759).

Xanthoria parietina (L.) Th. Fr.

SAN CLEMENTE DE TUYU: On bark (CIBIMA 20838, MVM 17832). LA LUCILA: Wooden fence post, *Pinus* forest (MVM 17820). PUNTA MEDANOS: Wooden fence post on the beach (CIBIMA 20841).

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MYCOTAXON

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THE GENUS *COPRINUS* IN WESTERN NORTH AMERICA, PART II: SECTION *LANATULI*¹

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SUMMARY

This second paper of a series on western North American species of *Coprinus* considers 12 species and 3 varieties comprising the western representatives of the section *Lanatul*. Eight new species, *Coprinus brunneistragulatus*, *C. undulatus*, *C. sylvicola*, *C. marcidus*, *C. bubalinus*, *C. alutaceivelatus*, *C. pachydermus*, and *C. tectisporus* are described. Two new varieties, *C. lagopides* var. *trisporus* and *C. cinereus* var. *depressus* are also described. *C. macrorrhizus* f. *microsporus* is given new status. A key to the species and varieties found in western North America is provided.

INTRODUCTION

In this second paper on western North American *Coprini*, 12 species and 3 varieties are added to those previously reported (Van De Bogart, 1976). Eight species and two varieties are described as new and one taxon is given new status.

The materials and methods, terminology and color terminology are as used in the first paper of this series (Van De Bogart, 1976).

¹ This paper is based in part on a thesis submitted to the Graduate School of the University of Washington in partial fulfillment of the requirements for the degree of Doctor of Philosophy.

All collections examined are deposited in the Mycological Herbarium of the University of Washington (WTU). The collections used for preparing the camera lucida drawings and in obtaining the microscopical data are indicated by an asterisk (*) after the collection number.

Coprinus Pers. per S. F. Gray, Section Lanatuli Fr., Epicrisis, p. 250, 1838.

Pileal surface except for the apical disk usually composed of radially oriented hyphae or radially elongated cells, at first covered very loosely with scales of universal veil composed mostly of parallelly oriented hyphae. Individual cells of scale hyphae often long and swollen, constricted at the septations, not branched, somewhat ctenulate in appearance. Universal veil completely devoid of sphaerocysts. Large characteristic pleurocystidia present. Stipe without annulus, but sometimes with an annular line or small flange near the base where contacted by the margin of the unexpanded pileus. Sporocarps very variable in size, from minute to rather large. Spores less than 15 μ m long, smooth walled or with an inflatable perisporium. Growing on dung, soil, decaying wood, or on charcoal.

TYPE SPECIES: Coprinus cinereus Schaeff. per S. F. Gray, Nat. Arr. Brit. Plants, p. 634, 1821.

Observations: The species of section Lanatuli found in western North America seem to fall into two general categories, one with globose to subglobose spores, and one with ellipsoidal spores.

KEY TO TAXA OF SECTION LANATULI

- | | | |
|----|--|---|
| A. | Spores globose, subglobose, or broadly limoniform | B |
| A. | Spores ellipsoidal | E |
| B. | Spores with an easily dislodged but rather thick, pale brown perisporium, apiculus very small
..... 1. <u>Coprinus brunneistragulus</u> | |
| B. | Spores without a perisporium, apiculus medium or large size | C |

- C. Cells of universal veil 5.1-10.0 μm in diameter,
not swollen or constricted at the septations; spores
7.9-11.3 μm in diameter 2. Coprinus undulatus
- C. Cells of universal veil 2.5-67.5 μm in diameter,
mostly swollen and constricted at the septations;
spores 5.0-9.1 μm in diameter D
- D. Basidia four-spored
..... 3. Coprinus lagopides var. lagopides
- D. Basidia mostly three-spored, rarely
two- or four-spored
..... 4. Coprinus lagopides var. trisporus
- E. Basidia variable, intergrading in sizes and
shapes; pileal context and subhymenium pallid
yellow microscopically, veil thin, reddish
brown 5. Coprinus sylvicola
- E. Basidia of several rather distinct sizes and
shapes without intergradations; pileal context
and subhymenium often not pallid yellow micro-
scopically, veil thick or thin, not reddish brown F
- F. Autolysis restricted to the lamellar
margin; veil dark gray to almost black
..... 6. Coprinus marcidus
- F. Autolysis much more general, often
involving the entire pileus; veil white
to yellowish tan, ochre, or light brown .. G
- G. Germ pore eccentric H
- G. Germ pore apical I
- H. Lignicolous, universal veil white
..... 7. Coprinus bubalinus
- H. Terrestrial, universal veil tan
..... 8. Coprinus alutaceivelatus
- I. Most universal veil cells with walls up to 1.5
 μm thick 9. Coprinus pachydermus

- I. Most universal veil cells with walls less than
1.5 μm thick J
- J. Spores with perisporium, spore wall
1.8-1.9 μm thick ... 10. Coprinus tectisporus
- J. Spores without perisporium, spore wall
usually 0.8 μm or less thick K
- K. Coprophilous or on rotting hay, straw, or
similar materials L
- K. On wood, twigs and leaves, rich humus, or
other soils, usually in wooded areas N
- L. Stipe base terminating rather abruptly
into a mycelial mass either at or just
below the substrate surface
..... 11. Coprinus fimetarius
- L. Stipe base terminating in a long, tapering,
usually solid radicating process that is
often inserted deeply into the substratum M
- M. Spores 12.5-15.6 μm long
12. Coprinus macrorhizus var. macrorhizus
- M. Spores 7.5-11.2 μm long
13. Coprinus macrorhizus var. microsporus
- N. Spores ellipsoidal in lateral view, with
no well-defined suprahilar flattening
14. Coprinus cinereus var. cinereus
- N. Spores roughly ellipsoidal in lateral view,
with well-defined suprahilar flattening
15. Coprinus cinereus var. depressus
1. Coprinus brunneistragulatus VAN DE BOGART sp.
nov. (Fig. 1)

Pileus primo ovatus dein conicus, postea campanulatus, postremo revolutus, primo 2.0-2.5 cm longus, post expansionem 4.0-6.0 cm latus, primo atrogriseus et ad apicem atrogriseibrunneus, fragmentis veli universalis pallidis, in maturatione atrogriseilascens et ad apicem

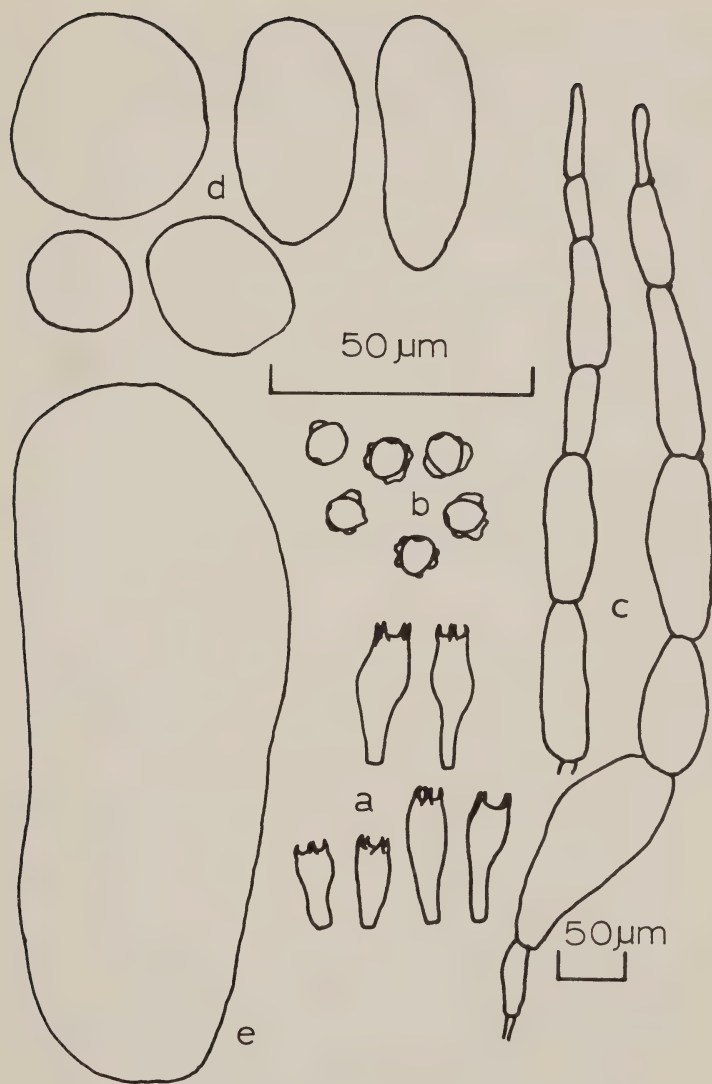


Fig. 1. *Coprinus brunneistragulatus* FVDB 194,
 a. basidia, b. spores, c. universal veil, d.
 cheilocystidia, e. pleurocystidia.

atrobrunneilascens; pagina pilei primo velo universali crasso et coacteo omnino obsecta, in maturatione aliquantum plicato-striata et velo universali partim obsecta; velum universale in fragmenta irregulares rumpens; caro tenuis et membranacea etiam ad apicem. Stipes cavus, gracilis, basi abruptus, 10-12 cm x 2.0-2.5 mm, candidus vel albidus, opacus, pagina stipitis aliquantum fibrillosa; carne tenui, fragili, facile bractea.

Sporae laeves, e subglobosis in obese limoniformis variantes, per transectionem rotundae, 6.9-8.8 x 6.2-7.5 μm , poro germinali apicali, in cumulo atrobrunneae, per microscopium saturate purpureibrunneae perisporio prominenti pallide brunneo; basidia trimorphica, tetraspora; basidia breviter clavata 14.0-16.0 μm longa, 6.0 μm crassa, basidia longe clavata 22.0-23.0 μm longa, 7.5 μm crassa, basidia ululiformia 24.0-26.5 μm longa, 17.0-22.0 μm crassa, ad apicem rotundata, parietibus rotundatis, hyalina, laevia, parietibus tenuibus, 110.0-142.0 μm longa, 45.0-51.0 μm crassa, numerosissima, in lamella admodum contigua saepe per apicem inclusa. Pagina pilei ex hyphis radiantibus; velum universale ex fragmentis grandibus pileo adhaerentibus, et catenis hypharum rasilium, tenuitunicatarum, hyalinarum, cylindricarum vel magnopere tumidarum, 40.0-150.0 x 11.2-44.0 μm , ad septa vulgo constrictarum. Catenae cellularum ut videtur inter se adhaerentes, sed raro anastomosantes; fibula ad stipitem et in velo universali adsunt.

Holotypus FVDB 194, terrestris, solitarius, in loco graminoso humido et umbroso ad sinum mutiny dictum insulae whidbey in comitato Insula dicto pagi Washingtonis 6 Octoberis 1968 lectus, in herbario Universitatis Washingtonii (WTU) conservatus.

PILEUS at first ovate, then conical, then campanulate, and finally revolute. Prior to expansion 2.0-2.5 cm in length, after expansion 4.0-6.0 cm in breadth. At first dark grey with lighter colored universal veil patches and dark greyish brown at the apex, with maturity becoming darker grey and brownish black at the apex. Some plicate striations developing under the universal veil, the striations often masked at least in part by the veil. Surface completely covered at first, and partly covered at maturity by a feltlike universal veil that breaks up into irregular patches as the pileus expands. Flesh thin and membranous even at the apex.

STIPE hollow, thin, slender, tapered from base to apex, 10-12 cm x 2-5 mm. Base nearly abrupt. White or faintly greyish, opaque. Surface somewhat fibrillose. Flesh thin, fragile and easily broken.

LAMELLAE narrowly lanceolate, some lamellulae present, 0.5-2.8 cm x 3-4 mm, free or slightly adnexed. when young, crowded at first, then less so as pileus expands and plicate striation develops. Pale then blackish brown. Autodigestion incomplete, most of the lamellae lysing but usually most of the pileal surface remaining.

ODOR AND TASTE not observed.

SPORES subglobose to broadly limoniform, round in cross-section, 6.9-8.8 x 6.2-7.5 μm , apiculus tiny but often visible, germ pore apical, 1.0-1.4 μm in diameter. Color en masse brownish black, microscopically deep purple-brown in 3% KOH. Contents guttulate or not. Wall with a prominent pale brown perisporium that shows best on spores of young specimens but is also found on those of older specimens.

CYSTIDIA: Cheilocystidia globose, 12.5-38.0 μm in diameter, or ellipsoidal with rounded ends, 44.0-50.0 x 17.0-22.0 μm hyaline, thin walled, smooth. Pleurocystidia long ellipsoidal, ends usually rounded, 110.0-142.0 x 45.0-52.0 μm . hyaline, smooth, thin walled, numerous, often bridging between two opposing lamellae. No other cystidia present.

PILEAL SURFACE of radially oriented hyphae.

UNIVERSAL VEIL of large patches adhering to the pileus, composed of chains of smooth, thin walled, hyaline, cylindrical to greatly swollen hyphae 40.0-150.0 x 11.2-44.0 μm , constricted at the septae in most cases. The chains of cells seem to be adherent to each other but are seldom anastomosed.

CLAMP CONNECTIONS present on stipe and universal veil.

HABITAT terrestrial, on moist shaded lawns, solitary.

Observations: This species resembles Coprinus lagopides

Karst. in most ways but differs markedly in the presence of a pigmented perisporium.

Material Examined. Washington: HOLOTYPE, FVDB 194*, 6 October, 1968.

2. Coprinus undulatus VAN DE BOGART sp. nov. (Fig. 2)

Pileus primo elongato-glandiformis demum anguste conicus, postea campanulatus, postremo laciniatus et aliquantum revolutus, primo 1.0-3.1 cm longus, post expansionem 1.0-3.4 cm latus, primo velo universali albo vel alutaceo obtectus, pagina pilei subter velo pallide brunnea et ad apicem hygrophane brunnea, in maturatione ex brunnea hygrophane atrogrisea et ad apicem atrogriseibrunnea, primo leviter striata demum leviter plicato-striata, striae ut videtur nullo modo in tramam lamellarum penetrantes. Velum universale tenue, intertextum, ad pileum adhaerens, in maturatione pro parte maxima evanescens. Caro tenuis, membranacea, ad apicem usque ad 1.0 mm crassa. Stipes cavus, gracilis, 2.0-6.0 cm longus, 1.5-6.0 mm crassus, albus, opacus, juventute parte supra luminis telam hypharum laxarum capienti, pagina pro parte maxima laevis et glabra, sericea, juventute ad basem fragmentis veli universali instructus; basis aliquantum carnosa, sed post formationem sporarum fragiles-cens. Lamellae anguste lanceolate, lamellulis paucissimis, 0.9-3.0 cm longae, 2.0-5.0 mm crassae, liberae sed stipiti approximatae, confertae, primo albae dein pallide aeneae, postea aeneae vel cinereae et postremo atrae, autolysis completa.

Sporae globosae 7.9-11.3 μm diam, poro germinationis apicali 2.2-2.5 μm lato; in cumulo atrae, per microscopium atropurpureibrunneae, contextis subtiliter granulatis, pariete levi. Basidia dimorphica, tetraspora, basidia breviter clavata 20.2-27.0 μm longa, 9.0-10.7 μm crassa, basidia longe clavata 31.5-37.0 μm longa, 10.3-11.3 μm crassa. Cheilocystidia variabilia, globosa, 11.2-36.0 μm lata, ovata vel ellipsoidea 22.5-92.4 μm longa, 17.0-29.3 μm crassa, hyalina, laevia, tenuitunicata. Pleurocystidia longioblonga vel longiellipsoidea, 112.0-168.0 μm longa, 27.0-58.3 μm crassa, hyalina, laevia, tenuitunicata, apicibus rotundatis, pedicellis usque ad 6.0 μm longis. Pagina pilei ex hyphis tenuitunicatis radiantibus constans. Velum universale filamentis cylindraceis ad septa nec inflatis nec constrictis quamquam diametro

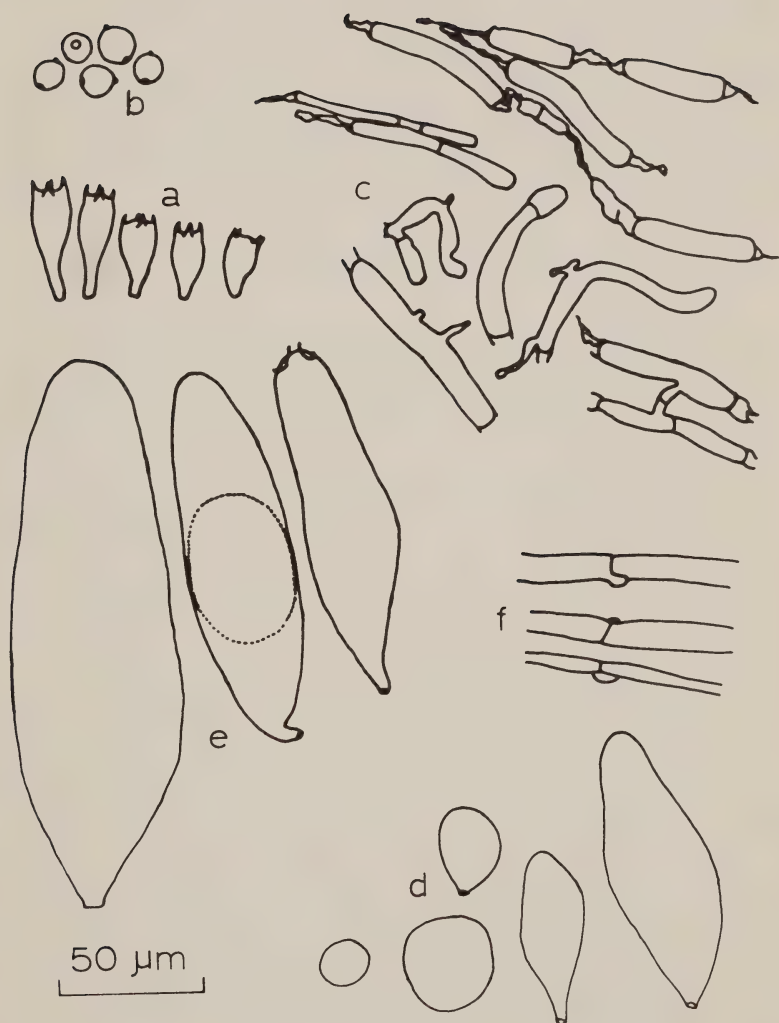


Fig 2. *Coprinus undulatus* FVDB 2182, a. basidia, b. spores, c. universal veil, d. cheilocystidia, e. pleurocystidia, f. stipe clamp connections.

amplo, 23.6-110.0 μm longis, 5.1-10.0 μm crassis, tenuitunicatis, cytoplasma abundanti ubi vivis, hyalinis, cellulis pro parte maxima curvatis; cellulae veli formationi catenarum hyphoidearum propensae, quamquam cellulis multis libris, et persaepe cellulis evacuatis collapsis. Cellulae aliquot semel ramificantes, nonnullae maculas leviter incrassatas in pariete praebentes. Velum proparte maxima in pagina pilei et in quantitibus parvis ad basem stipitis speciminum juvenum. Catenum elementorum veli plus minus radiatim dispositae autem sinuosae propter curvaturam parietum cellularum.

Fibulae ad basem stipitis adsunt; sporocarpium odore et sapore nullo.

Holotypus FVDB 2182, in solo vel in materia vegetabili unde crescit Agaricus brunnescens Peck (= A. bisporus), comitato Thurston pagi Washingtonis, 20 Novembris, 1973, in herbario Universitatis Washingtonis (WTU) conservatus.

PILEUS at first long-glandiform or truncate-ellipsoidal, then narrowly conic, then narrowly campanulate, and finally becoming laciniate and somewhat revolute. Prior to expansion 1.0-3.1 cm in length and after expansion 1.0-3.4 cm in breadth, covered at first by white to pale tan universal veil, the surface beneath pale brown to hygrophanous brown at the apex, at maturity becoming dark hygrophanous grey with a hint of brown and dark brownish grey at the apex, faintly striate at first, eventually becoming slightly plicate-striate. The plicate striations do not seem to involve the trama of any of the lamellae. Universal veil thin, interwoven, adherent, by maturity mostly disappearing. Flesh thin and membranous but up to 1.0 mm thick at the apex.

STIPE hollow, slender, tapered from base to apex, 2.0-6.0 cm x 1.5-6.0 mm. White and opaque. When young, loose hyphae often present in upper half of lumen. Most of surface smooth and glabrous, silky in appearance. In button stages, some small patches of universal veil at the base. Base somewhat fleshy, fragile by the end of spore production.

LAMELLAE narrowly lanceolate, mostly full length, only a few lamellulae present, 0.9-3.0 cm x 2.0-5.0 mm, free, extremely crowded and remaining so until lysis.

White, then pale bronze, then bronze, then grey, and finally sooty black. Autodigestion complete, with the entire pileus lysed.

ODOR AND TASTE none.

SPORES globose, 7.9-11.3 μm in diameter, round in any section, lacking a perisporium, apiculus large, 1.2 x 1.2 μm , germ pore apical, 2.2-2.5 μm in diameter. Color en masse sooty black, microscopically dark purple-brown in 3% KOH. Contents seem finely granular. Wall smooth.

BASIDIA dimorphic, short clavate and 20.2-27.0 x 9.0-10.7 μm , long clavate and 31.5-37.0 x 10.3-11.3 μm , all four-spored.

CYSTIDIA: Cheilocystidia variable in shape, sphaerocysts 11.2-36.0 μm in diameter, ovate to ellipsoidal, 22.5-92.4 x 17.0-29.3 μm , hyaline, smooth, thin walled, forming a broad band on the lamellar margin. Pleurocystidia long-oblong to long-ellipsoidal, 112.0-168.0 x 27.0-58.3 μm , apices rounded, pedicels usually present, about 6 μm long, hyaline, thin walled, smooth. No other cystidia present.

PILEAL surface of thin-walled, radially oriented hyphae that revive poorly.

UNIVERSAL VEIL of cylindrical filaments, not swollen or constricted at the septa although of large diameter, 23.6-110.0 x 5.1-10.0 μm , thin walled, with abundant cytoplasm in fresh material, hyaline, most cells curved. Cells tending to form hyphalike chains although many loose cells are present, and very often there are collapsed empty cells. A few cells branch once, and some show slightly thickened spots on the cell wall. Veil present mostly on pileal surface and in small amounts at the base of the stipe of young specimens. The chains of veil elements are more or less radially oriented but sinuous due to the curvature in the wall of most cells.

CLAMP CONNECTIONS present only (?) on stipe.

HABITAT terrestrial or subcoprophilous on prepared compost intended for commercial production of Agaricus brunnescens in closed controlled-environment buildings. In large clusters.

Observations: The universal veil elements and spores of this species are distinctive, and the habitat seems to be unique. Personal communications with the staff mycologist of the Ostrom Mushroom Company of Lacey, Washington, indicate that this species is considered a pest, detrimental to obtaining maximum yields of Agaricus brunneocens Peck, Bull. Torrey Bot. Club 27: 16, 1900 (= A. bisporus). The spores or mycelium of Coprinus undulatus appear to be capable of surviving the company's present sterilization techniques for the compost.

Material Examined. Washington: HOLOTYPE, FVDB 2182*, 20 November, 1973: FVDB 3902.

3. Coprinus lagopides Karst., Hattsvampar, p. 535, 1879, var. lagopides (Fig. 3).

PILEUS at first short glandiform, then conic, then campanulate, and finally revolute. Prior to expansion 1.5-3.0 cm in length and after expansion 3.0-5.5 cm in breadth. Pale greyish white to pale brown at first, apex concolorous with remainder of pileus, at maturity becoming grey to dark brownish grey with the apex dark brownish grey to almost black. Plicate striations usually develop quickly. Surface covered with many small loose white or almost hyaline scales that are easily dislodged. Flesh thin and membranous, usually less than 1.0 mm thick even at the apex.

STIPE hollow, slender, tapered slightly from base to apex, 8-15 cm x 2.5-5.0 mm. White, opaque, surface sometimes glabrous but usually with few to numerous bits of loose hyphae scattered along the length of the stipe or more frequently with some small white or pale brown scalelike patches on or near the base. Flesh usually somewhat fibrous although thin and easily broken.

LAMELLAE narrowly lanceolate, 0.8-2.8 cm x 3.0 mm, free and remote, extremely crowded at first then less so as plicate striations develop with pileal expansion, white then black. Autodigestion generally incomplete, only the bottom half of each lamella lysing, and the remainder either withering or becoming putrified.

ODOR AND TASTE none.

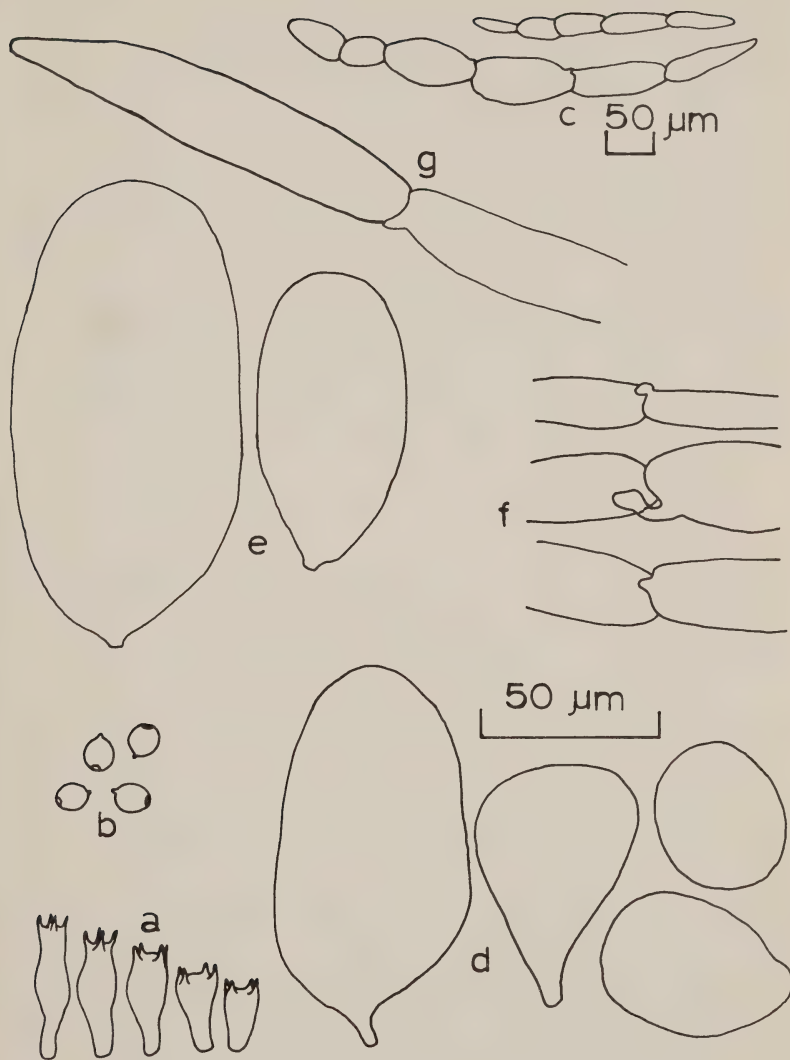


Fig. 3. *Coprinus lagopides* var. *lagopides* FVDB 2154, a. basidia, b. spores, c. universal veil, d. cheilocystidia, e. pleurocystidia, f. stipe clamp connections, g. universal veil clamp connection.

SPORES subglobose to limoniform, round in cross-section, (5.9-)6.2-9.4(-11.2) $\times$ 5.0-6.3(-8.1) μm , lacking a perisporium, apiculus medium to large and mostly conspicuous, germ pore apical 0.8-1.9 μm in diameter. Color en masse from dark brown to soot black, microscopically deep purple, deep purple-brown, or deep purple-black in 3% KOH. Walls smooth.

BASIDIA trimorphic, short clavate and 16.2-19.5 $\times$ 8.1 μm , long clavate and 22.0-28.8 $\times$ 10.0 μm , ululiform and 28.8-35.0 $\times$ 10.0 μm , all four-spored.

CYSTIDIA: Cheilocystidia of several shapes, sphaerocysts 20.0-50.0 μm in diameter, obclavate to ellipsoidal, 36.0-104.0 $\times$ 18.7-53.8 μm , smooth, thin walled, hyaline. Pleurocystidia ellipsoidal, 67.5-137.5 $\times$ 37.5-62.5 μm , smooth, hyaline, thin walled, sometimes bridging between lamellae, numerous to widely scattered. No other cystidia present.

PILEAL SURFACE of radially oriented hyphae.

UNIVERSAL VEIL present on pileus and sometimes at base of stipe as fibrillose scales. Veil elements consisting of long chains of swollen sausage-like cells 25.0-250.0 $\times$ 2.5-67.5 μm , constricted at the septae, thin walled, hyaline, smooth, rarely branched.

CLAMP CONNECTIONS present on stipe, universal veil, and occasionally in the pileal trama.

HABITAT terrestrial or seemingly lignicolous; on soil, woody debris, or most often on rotting stumps of Acer macrophyllum. Solitary, or in small groups.

Observations: P. D. Orton (1957) appears to have investigated this species rather fully and synonymizes C. jonesii Peck, C. funariarum Metrod, and C. lagopus var. sphaerosporus Kühner and Josseland with it. My collections of what I consider to be var. lagopides were all on soil, woody debris, or rotten maple wood, but not on burnt soil (which is the habitat stressed by Orton). My two collections of var. trisporus were, however, from burnt soil.

Material Examined. Washington: FVDB 7, 172, 226, 2154*.

4. Coprinus lagopides var. trisporus VAN DE BOGART
var. nov. (Fig. 4).

A typo differt basidiis pro parte maxima trisporis, dum e contra basidiis tetrasporis vel bisporis aliquot raris.

Holotypus FVDB 2158 in solo arenario nuper ambus-
to ergo fragmentis carbonis numerosis in vivario republi-
cae Mons Rainier dicto in comitato Pierce pagi Washing-
tonis 5 Octoberis 1952 lectus, in herbario Universitatis
Washingtonis (WTU) conservatus.

As described in var. lagopides except that the
basidia are mostly three-spored, with four-spored or
two-spored basidia being fairly rare. The habitat is on
recently burnt soil and charred debris.

Material Examined. Washington: HOLOTYPE, FVDB
2158*, 5 October 1952; FVDB 61.

5. Coprinus sylvicola VAN DE BOGART sp. nov.
(Fig. 5).

Pileus primo longus e margo ad apicem parum con-
tractus sed fere cylindricus, apice obtuse rotundato,
demum conicus, postea campanulatus margine explanato,
postremo revolutus, primo 1.5-2.0 mm longus, post ex-
pansionem 3.0 cm latus, primo cinereus et ad apicem
cinereibrunneus, mox plerumque atrocinerascens apice
atrocineribrunneo. Pagina pilei subter velo permature
plicato-striata, striae in pileis partim expansis saepe
prominentes; pagina fere laevia sed diligenter observata
squamis et filis minutis rufulibrunneis praebens. Caro
tenuis etiam ad apicem. Stipes cavus, gracilis, e basi
versus apicem parum contractus, 7.0-9.0 cm longus,
1.5-2.5 mm crassus, sordide albus vel dilute cinereus,
opacus, pagina stipitis pro parte maxima laevis et glabra
sed squamis parvis appressis aliquot in parte inferna dis-
positis; caro tenuis, fragilis et friabilis. Lamellae an-
guste lineares, lanceolatae, lamellulis paucis, 1.8 cm lon-
gae, 1.5-2.5 mm latae, liberi et stipite remotae, primo
confertissimae dein subdistantes, albae dein pallescentes
et rufulibrunneae, postea atrobrunneae et postremo atrae,
autolysis fere completa.

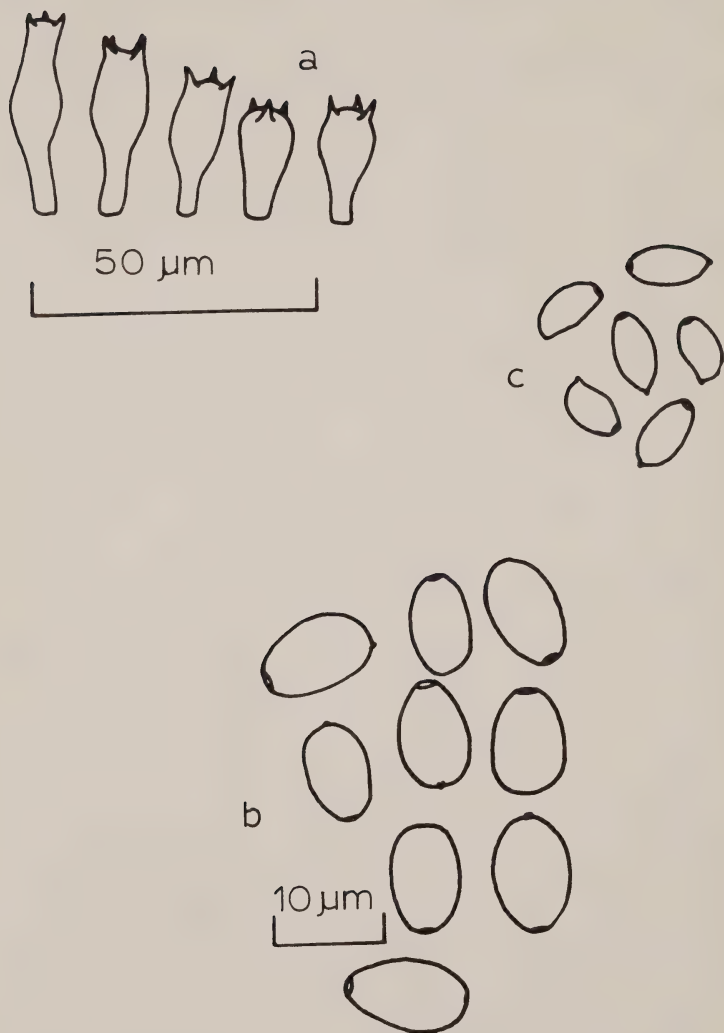


Fig. 4. *Coprinus lagopides* var. *trisporus* FVDB 2158, a. basidia, *C. macrorrhizus* var. *microsporus* FVDB 115, b. spores, *C. cinereus* var. *depressus* FVDB 264, c. spores.

Sporae laeves, ellipsoideae apicibus angustatis, per transectionem rotundatae, $13.7-15.0 \times 7.2-7.8 \mu\text{m}$, apiculo amplo proeminenti, poro germinationis apicali; in cumulo atrae, per microscopium atropurpureae. Basidia formis et amplitudine variabilissima, clavata, longa clavata, subululiformia, et ululiformia, $25.0-51.0 \mu\text{m}$ longa, $10.0-12.0 \mu\text{m}$ crassa. Cheilocystidia ovata vel ellipsoidea, $48.0-77.5 \mu\text{m}$ longa, $22.5-40.0 \mu\text{m}$ crassa, hyalina, tenuitunicata, laevia, etiam hyphis aliquot cylindraceis, hyalinis, laevibus, tenuitunicatis, ramosis et anastomosantibus $1.5-6.3 \mu\text{m}$ diam praesentibus. Pleurocystidia pauca, ovata vel ellipsoidea, $63.0-75.0 \mu\text{m}$ longa, $30.0-40.0 \mu\text{m}$ crassa, laevia, hyalina, tenuitunicata, et pro parte maxima prope marginem lamellarum disposita, cystidia alia desunt. Pagina pilei ex hyphis radiantibus constans. Velum universale in superficie pilei et ad basem stipitis squamis laxis quibus catenarum longorum cellularum inflatorum constantibus, cellulae catinarum $38.0-102.2 \times 3.0-5.0 \mu\text{m}$, ad septa constrictae, hyalinae, tenuitunicatae, laeves, raro ramosae.

Contextus pilei in percento tribus kali causticum luteibrunnea. Subhymenia lamellarum etiam in percento tribus kali causticum luteibrunnea, autem stratum tenue tramae medianae lamellarum hyalinum est.

Fibulae in contextu pilei, velo universali, pagina stipitis, et trama lamellarum adsunt.

Holotypus FVDB 297 in foliis emortuis, stramentis et fragmentis lignorum putrefactorum arborum coniferarum, in sylva mixta, Camp Kilowan, prope Falls City, comitato Polk, pago Oregonis 27 April 1972 lectus, in herbario Universitatis Washingtonis (WTU) conservatus.

PILEUS at first long, slightly tapered from base to apex but almost cylindrical, with the apex obtusely rounded, becoming conic, then campanulate with a flaring margin, and finally revolute, prior to expansion $1.5-2.0 \text{ cm}$ in length and after expansion $1.8-2.3 \text{ cm}$ in breadth, medium grey and apex medium grey-brown at first, but soon becoming generally dark grey and dark grey-brown at the apex. Some plicate striations present early under the universal veil and often prominent in partially expanded pilei. Surface almost smooth but close examination reveals minute reddish brown scales or filaments. Flesh thin.

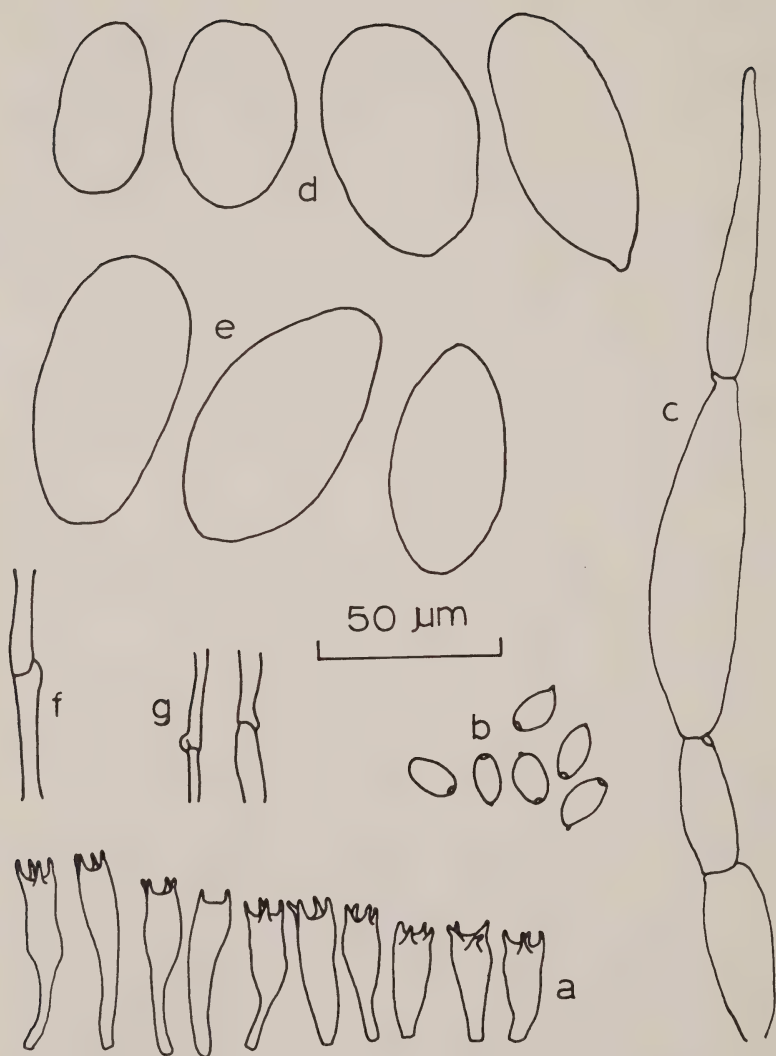


Fig. 5. *Coprinus sylvicola* FVDB 297, a. basidia, b. spores, c. universal veil, d. cheilocystidia, e. pleurocystidia, f. stipe clamp connection, g. pileal trama clamp connections.

STIPE hollow, slender, slightly tapered from base to apex, 7.0-9.0 cm x 1.5-2.5 mm, greyish to dirty white, opaque. Surface mostly smooth and glabrous but with a few appressed scalelike patches on lower one-third of stipe. Flesh thin, fragile, and brittle.

LAMELLAE narrowly linear-lanceolate, few, if any, lamellulae, 1.8 cm x 1.5-2.0 mm, free and remote, extremely crowded at first then subdistant due to development of plicate striations as pileus expands, white, then pale reddish brown, then dark blackish brown, and finally soot black. Autodigestion destroying most of each lamella and most of the rest of the pileus.

ODOR AND TASTE none.

SPORES ellipsoidal with tapering ends, nearly round in cross-section, 13.7-15.0 x 7.2-7.8 μm , lacking a perisporium, apiculus large and prominent, germ pore apical, 1.0-1.2 μm in diameter. Color soot black en masse, microscopically deep purple-black in 3% KOH. Walls smooth.

BASIDIA variable in shape and size. The shapes intergrade from clavate to long clavate to subululiform to ululiform, and sizes range from 25.0-51.0 x 10.0-12.0 μm . All four-spored.

CYSTIDIA: Cheilocystidia ovate to ellipsoidal, 48.0-77.5 x 22.5-40.0 μm , hyaline, thin walled, smooth. Some hyaline, smooth, thin walled, branched and anastomosed cylindric hyphae 1.5-6.3 μm in diameter present also along lamellar margin. Pleurocystidia ovate to ellipsoidal, 63.0-75.5 x 30.0-40.0 μm , hyaline, smooth, thin walled, few in number and present mostly near the lamellar margin. No other cystidia present.

PILEAL SURFACE of radially oriented hyphae.

UNIVERSAL VEIL on pileus and at base of stipe of loose scales composed of long chains of swollen cells, 38.0-102.0 x 3.0-25.0 μm , constricted at the septa, hyaline, thin walled, smooth, seldom branched.

PILEAL CONTEXT pallid yellow-brown in 3% KOH. The subhymenium of each side of each lamella is also yellow-brown in 3% KOH while the thin layer of median

lamellar trama is hyaline.

CLAMP CONNECTIONS present on stipe, universal veil, pileal trama, and lamellar trama.

HABITAT terrestrial or sublignicolous, on leaves and debris among chunks of rotten conifer wood lying on the soil in an old second-growth mixed forest. Small loose groups.

Observations: This species is notable for the variation and intergradation in sizes and shapes of the basidia, the very long, almost cylindrical shape of the unexpanded pileus, and the yellow-brown color of the pileal context and the subhymenium.

Material Examined. Oregon: HOLOTYPE, FVDB 297*, 27 May 1972.

6. Coprinus marcidus VAN DE BOGART sp. nov.
(Fig. 6).

Pileus primo glandulosus, dein conicus, postea planoconvexus, postremo revolutus, primo 4.0-5.0 mm longus, post expansionem 10.0 mm latus, pagina pilei primo pallide grisea vel alba, subter velo universali atrogrisea vel griseiatra, in maturatione pallidigrisea cum striis albis ubi pagina supra omnem tramam lamellarum, ad apicem atrogrisea, in maturatione profunde plicato-striata. Velo universali primo paginam pilei obscurans strato continuo fibrilloso atrogriseo vel subatro, quo demum in vestigia laciniosa finduntur et late disperguntur, cum paucis frustris amplioribus ad apicem pilei. Caro tenuis etiam ad apicem. Stipes cavus sed lumine columnam aquae capienti, gracilis vel filiformis, 3.5 cm longus, 0.6-1.1 mm crassus, versus apicem leviter angustatus, pallide griseus vel stramineus, ad basem haud translucidus, ad apicem semitranslucidus, pagina stipitis ad basem et ex parte sursum fibrillis grossis, strigosis, cinereis, obtectis, autem apice glabro; caro maxime tenuis, aquosa, fragilis. Lamellae anguste lanceolatae vel ellipsoideae, aliquot lamellulis, 2.0-4.3 mm longae, 1.0 mm latae, ab apice stipitis librae, autem lamellis longis omnibus ad collarium rudimentali affixis, primo confertae dein simul expansione pilei et conformatione plicato-

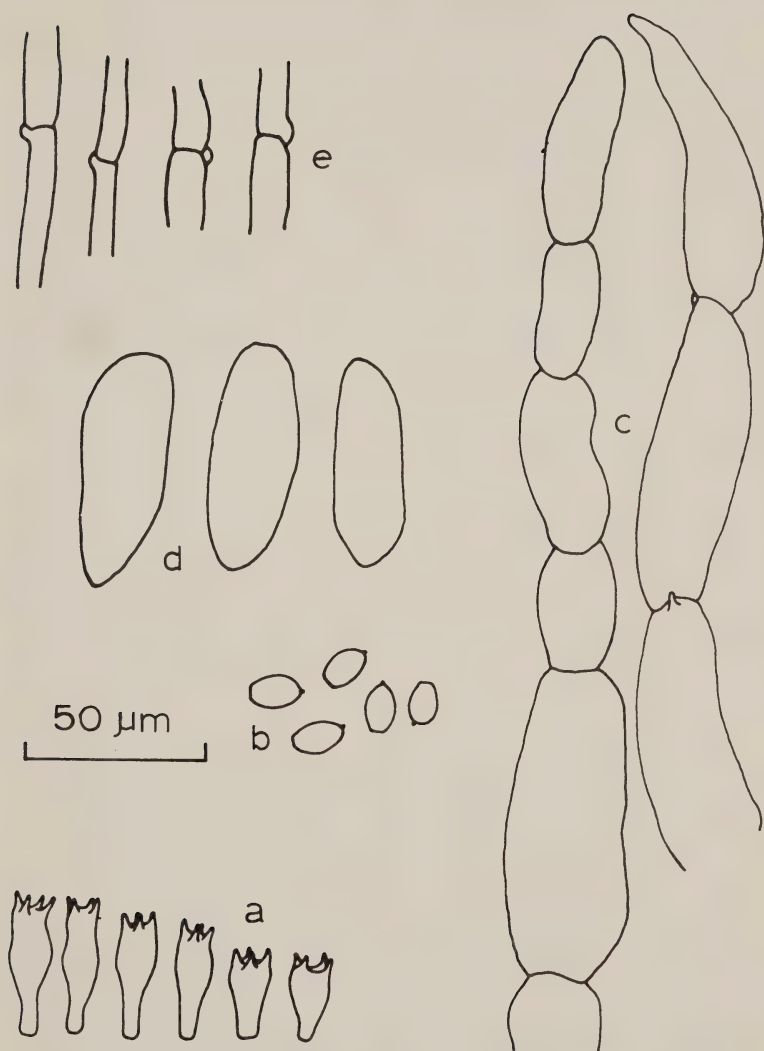


Fig. 6. *Coprinus marcidus* FVDB 2185, a. basidia, b. spores, c. universal veil, d. pleurocystidia, e. universal veil clamp connections.

striarum subdistantes, pallidae dein atrae, autolysis incompleta, solum marginibus per lysem affectis.

Sporae ellipsoideae, pro parte maxima per transectionem rotundae, aliquot leviter complanatae, $8.7-13.8 \times 6.2-8.3 \times 6.2-7.5 \mu\text{m}$, apiculo grandi et prominenti, poro germinationis apicali $1.2-1.5 \mu\text{m}$ diam, in cumulo atrae, per microscopium atropurpureiatrae, laevigatae. Basidia tetraspora, trimorphica, basidia breviter clavata $20.0-22.0 \mu\text{m}$ longa, $10.0 \mu\text{m}$ crassa, basidia longe clavata $30.0-32.0 \mu\text{m}$ longa, $10.0 \mu\text{m}$ crassa, basidia ululiformia $35.0-36.0 \mu\text{m}$ longa, $10.0 \mu\text{m}$ crassa. Cheilocystidia praecocissime liquescentia. Pleurocystidia pauca, tantum proxime margine lamellarum inventa, ellipsoidea, $60.0-80.0 \mu\text{m}$ longa, $23.0-26.0 \mu\text{m}$ crassa, apicibus rotundatis, hyalina, tenuitunicata, laevia. Pagina pilei ex cellulis elongatis radiantibus constans, cellulae paginarum in 3% KOH pallidibrunneae. Velum universali in pileo et ad basem stipitis stratum fuscum fibrillosum praebens, quem in maculis parvas irregulares findit, squamellas revolutas nihil prodit. Fibrillae et maculae catenarum cellularum elongatarum compositae, cellulis $50.0-100.0 \times 10.0-27.5 \mu\text{m}$, hyalinis vel pallide brunneis, tenuitunicatis, tumidis, ad septa constrictis, plerumque fibulatis, haud ramosis. Catinae nonnullae ad basium stipium parum vel haud tumidae sunt, et hyphis normalibus cylindraceis similes sunt. Fibulae in velo universali, in stipite, in trama pilei et lamellarum adsunt.

Holotypus FVDB 2185 in ligno inter muscos, in loco cognitionis naturae Universitatis Montanae, ad lacum Flathead dictum, pago Montana, 8 Sept. 1973, in herbario Universitatis Washingtonis (WTU) conservatus.

PILEUS at first glandiform, then conic, then plano-convex, and finally revolute. Prior to expansion $4.0-5.0$ mm in length and after expansion 10.0 mm in breadth. Pale grey or white at first under a dark grey to greyish black universal veil layer, then becoming pale grey with white striae where the surface overlies each lamellar trama, and dark grey at the apex. Surface becoming deeply plicate-striate. Universal veil at first obscuring the pileal surface with a continuous fibrillose dark grey to almost black layer that eventually splits into shredlike remnants and becomes widely scattered with a few larger fragments at the pileal apex. Flesh thin at the apex.

STIPE slender or filiform, 3.5 cm x 0.6-1.1 mm, tapering slightly from base to apex, hollow but with the lumen containing a column of water. Pale grey to glassy straw color, opaque at base to semitranslucent at apex. Surface covered with coarse and strigose grey fibrils at base and part way up the stipe, apical half glabrous. Flesh extremely thin, watery, and fragile.

LAMELLAE narrowly lanceolate or ellipsoidal, with some lamellulae, 2.0-4.3 x 1.0 mm, free from stipe apex but with all lamellae attached to a rudimentary collarium. Crowded at first then subdistant as plicate striation develops with pileal expansion, pale then soot black. Autodigestion incomplete, only the margins affected by lysis.

ODOR AND TASTE none.

SPORES ellipsoidal, 8.7-13.8 x 6.2-8.3 x 6.2-7.5 μm , mostly round in cross-section but with some larger spores slightly flattened, apiculus large and prominent, germ pore apical, 1.2-1.5 μm in diameter. Color en masse soot black, microscopically deep purplish black in 3% KOH. Walls smooth.

BASIDIA trimorphic, short clavate and 20.0-22.0 x 10.0 μm , long clavate and 30.0-32.0 x 10.0 μm , ululiform and 35.0-36.5 x 8.5-10.0 μm , all four-spored.

CYSTIDIA: Cheilocystidia probably present but not observed due to partially lysed condition of lamellar margins. Pleurocystidia few in number, located near the lamellar margins only, ellipsoidal, 60.0-80.0 x 23.0-26.0 μm , apices rounded, hyaline, thin walled, smooth. No other cystidia present.

PILEAL SURFACE of radially elongated cells, two to three times as long as broad, cell walls pale brown in 3% KOH.

UNIVERSAL VEIL present on pileus and at stipe base as a dark fibrillose layer that splits into small irregular patches but not into small upturned scales. Fibrils and patches composed of chains of elongate cells 50.0-100.0 x 10.0-27.5 μm , hyaline to pale brownish, thin walled, swollen, constricted at the septa, usually with clamp connections, unbranched. Some of the chains of cells present at stipe bases are little or not swollen and

resemble normal cylindrical hyphae.

CLAMP CONNECTIONS present on universal veil, on stipe, in pileal trama, and in the lamellar trama.

HABITAT lignicolous, on a piece of wood buried in a thick moss carpet on the floor of a conifer forest. Solitary.

Observations: This species possesses several distinctive features, of which the dark color of the veil and the pronounced absence of autodigestion except the lamellar margins are the most outstanding ones. More subtle but still distinctive characters are the pleurocystidia that are rather small and few in number, and the slightly colored cells of the pileal surface which are elongated radially but do bear some resemblance to the appearance of a cellular type of surface.

Material Examined. Montana: HOLOTYPE, FVDB 2185, 8 September, 1973.

7. Coprinus bubalinus VAN DE BOGART sp. nov.
(Fig. 7).

Pileus primo oblongo-rotundatus dein ellipsoideus tum conicus, postea campanulatus, postremo aliquantum revolutus, primo 1.0-3.5 cm longus, post expansionem 3.0-6.0 cm latus; pagina pilei primo velo universali albo oblecta, velum universale fragile, mox in squamis irregularibus rumpens et paginam pilei melleam vel luteialutaceam vel pallide ochraceam manifestans, apice pilei concolori; pagina pilei aliquantum lubrica, in maturitate plicato-striata; caro bubalina, tenuis et fragilis, pileus per lysis omnino denigratus. Stipes cavus, aliquantum medullosus, materia medullosa in glaebris gelatinosis siccans; gracilis, leviter versus apicem contractus, primo 1.5-4.0 cm longus, 1.0-1.4 cm crassus, in maturitate 6.0-8.0 cm longus, 0.4-0.8 cm crassus, albidibubalinus, ubi contusus bubalinus, opacus; pagina stipitis obscure pruinosa in sporocarpis juvenibus, residua parva et evanescentia veli universalis circa 4.0 mm supra basim stipitis ferens; caro fragilis. Lamellae lanceolatae, 1.0-2.7 cm longae, 1.0-3.0 mm latae, confertae, librae vel leviter adnexae, primo albidibubalinae dein cinereiatrae et colubrinae, margines lamellarum immaturarum albidicinerei.

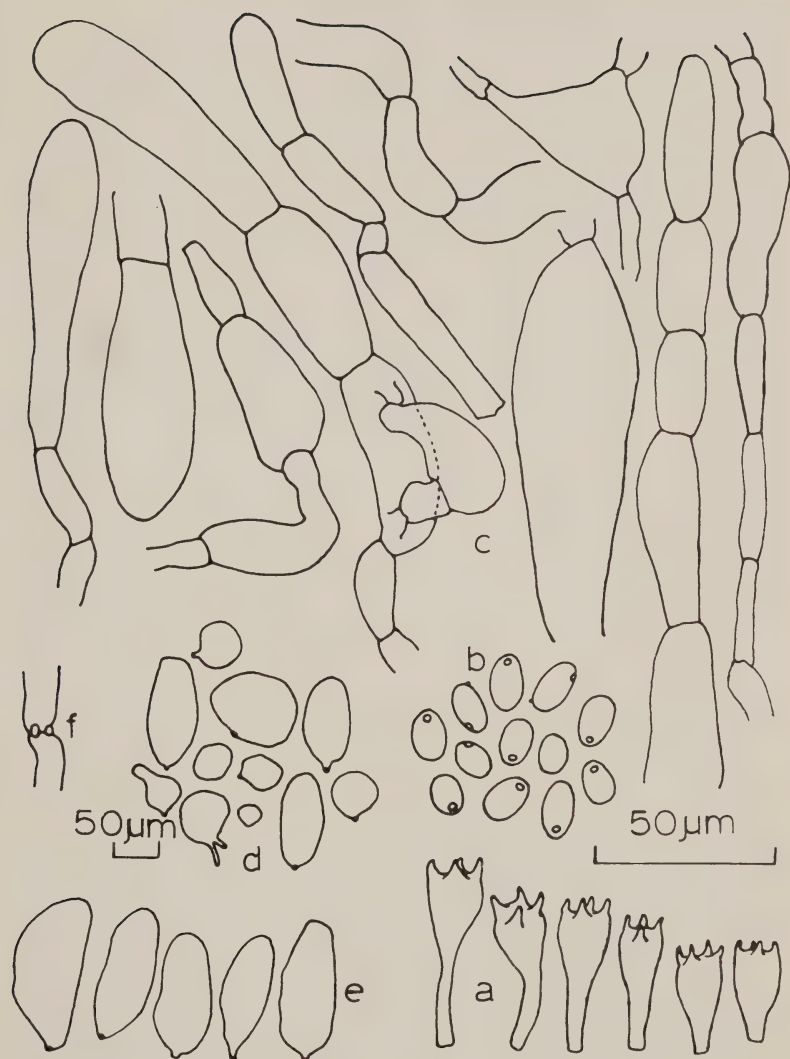


Fig. 7. *Coprinus bubalinus* FVDB 3821, a. basidia, b. spores, c. universal veil, d. cheilocystidia, e. pleurocystidia, f. stipe clamp connections.

Aliquot lamellulae adsunt. Autolysis completa. Odor fungalis vel humosus; sapor fungalis.

Sporae laeves, ellipsoideae, leviter complanatae, 10.0-14.1 x 6.7-8.5 x 6.2-6.8 μm , apiculo parvo, poro germinationis excentrico, 1.7-2.1 μm diam; in cumulo atrae, per microscopium purpureiatrae, et mox in 3% KOH brunneiatrae. Basidia tetraspora, trimorphica sed per formam et magnitudinem vix perfecte distincta; basidia breviter clavata 22.0-28.0 μm longa, 11.0-12.0 μm crassa, basidia clavata 34.0-39.0 μm longa, 11.0-12.0 μm crassa, basidia longe clavata 40.0-49.0 μm longa, 14.5 μm crassa. Cheilocystidia globosa et 10.0-50.0 μm diam vel ellipsoidea et 50.0-65.0 x 22.0-28.0 μm , aliquot pedicellis 0.1-5.0 μm longis, hyalina, rasilitunicata, tenuitunicata. Pleurocystidia ellipsoidea, 70.0-93.0 μm longa, 28.0-43.0 μm crassa, aliquot pedicellis 0.1-3.0 μm longis, hyalina, rasilitunicata, tenuitunicata, aliquot in lamellis crebre contiguis saepe per apicem inclusa. Pagina pilei in maturitate pro parte maxima e cellulis tumidis et elongatis radiantibus constans, aliquot cellulae isodiametrae adsunt. Velum universale coactum vel arachnoideum vel pruinatum, primo super paginam pilei continuum, mox in fragmentis parvis et irregularibus ruptum, ex hyphas constans, quarum cellulae cylindriceae vel pertumidae 12.0-116.0 x 12.0-36.0 μm sunt; cellulae tumidae ad septa contractae, nonnullae cellulae ramosae, omnes cellulae hyalinae, tenuitunicatae, laeves, hae ad apicem catenarum hypharum pro parte maxima clavatae et tumidae. Frustilla veli ad paginam pilei et ad basim stipitis ex eadem cellulae composita. Fibulae ad stipitem raro inventa.

Holotypus FVDB 3821 in ligno emortuo Juglantis vel Mori, Lafayette, in comitato Contra Costa pagi Californiae a cl. Thomas Duffy Aprileis 1976 lectus, in herbario Universitatis Washingtonis (WTU) conservatus.

PILEUS at first rounded oblong, then ellipsoidal, then conical, then campanulate, finally somewhat revolute. Prior to expansion 1.0-3.5 cm in length and after expansion 3.0-6.0 cm in breadth. Surface at first covered with a white universal veil. Veil fragile, soon breaking up into irregular patches revealing a honey colored, yellow-tan to light ochre pileal surface. Color of pileal apex similar. Entire pileus blackens with lysis. Moderately plicate-striate. Surface under the veil somewhat lubricous. Margin of young pileus curved in to stipe. Flesh buff colored,

thin, fragile.

STIPE hollow and somewhat pithy. The pithy material drying into gelatinous lumps. Slender, slightly tapered, at first 1.5-4.0 x 1.0-1.4 cm, when mature 6.0-8.0 x 0.4-0.8 cm, whitish buff, bruising tan, opaque, surface faintly pruinose, small evanescent remnants of the universal veil present on young specimens about 4.0 mm above the base. Base merges into a fine white mycelium. Flesh fragile.

LAMELLAE lanceolate, some lamellulae also present, 1.0-2.7 cm x 1.0-3.0 mm, crowded, free or slightly adnexed, at first whitish tan, then mottled grey-black, immature lamellar margins whitish cinereous. Autolysis complete unless halted by drying.

ODOR fungoid or earthy. Taste fungal.

SPORES ellipsoidal, slightly flattened, 10.0-14.1 x 6.7-8.5 x 6.2-6.8 μm , lacking a perisporium, apiculus small, germ pore eccentric, 1.7-2.1 μm in diameter. Color en masse black, microscopically purplish black and soon deep brownish black in 3% KOH. Wall smooth.

BASIDIA trimorphic but not completely separate and distinct in sizes and shapes, short clavate and 22.0-28.0 x 11.0-12.0 μm , clavate and 34.0-39.0 x 11.5-12.0 μm , long clavate and 40.0-49.0 x 14.5 μm , all four-spored.

CYSTIDIA: Cheilocystidia globose 10.0-50.0 μm in diameter or ellipsoidal 50.0-65.0 x 22.0-28.0 μm , some with pedicel, 0.1-5.0 μm in length, hyaline, thin walled, smooth. Pleurocystidia ellipsoidal, 70.0-93.0 x 28.0-43.0 μm , some with pedicel, 0.1-3.0 μm in length, hyaline, thin walled, smooth. Some bridging between two opposing lamellae. No other cystidia present.

PILEAL SURFACE of mature sporocarps composed of swollen cells, mostly elongate in a radial direction, some isodiametric cells also present.

UNIVERSAL VEIL felt-like or arachnoid or pruinose, at first continuous over pileal surface, soon breaking up into small irregular patches, composed of hyphae with cylindrical to very swollen cells, 12.0-116.0 x 12.0-36.0 μm , the swollen cells with constricted septa, some cells

branched, all hyaline, thin walled, smooth. Cell at tip of hyphal chains mostly clavate-swollen. Same cell types present in veil remnants on pileus and stipe base.

CLAMP CONNECTIONS rarely present on stipe only.

HABITAT lignicolous, on walnut and mulberry slash, solitary or small clusters.

Observations: This species seems to be closely related to Coprinus sylvicola, C. marcidus and C. alutaceivelatus. The pithy material in the stipe of young sporocarps which upon drying becomes gelatin-like lumps is somewhat distinctive. C. bubalinus resembles C. alutaceivelatus in its overall appearance and the presence of eccentric germ pores on spores of both. It differs in its lack of pigmented pileal context and in having trimorphic basidia as opposed to dimorphic. The color of the pileal surface below the universal veil is much more yellow in C. bubalinus than the more nearly brown surface of C. alutaceivelatus.

Material Examined. California: HOLOTYPE, FVDB 3821*, April 1976.

8. Coprinus alutaceivelatus VAN DE BOGART sp. nov.
(Fig. 8)

Pileus primo glandiformis dein conicus, postremo campanulatus, primo 1.0-2.0 cm longus, post expansionem 1.7-2.9 cm latus, pagina pilei infra velum universale primo alutacea apice mediocriter brunneo, in maturitate luteibrunnea infra velum universale alutaceum, et apice infra vestigia veli brunneo. Pagina pilei primo velo obtecta, dein plicato-striata infra vestigia parva, coactea et irregularia veli universalis. Caro tenuis et membranaacea. Stipes cavus, contentuum omnino cassus, tenuissimus et versus apicem angustatus, 1.0-2.5 cm longus, 2.0-3.0 mm crassus, albus, impellucidus, pagina glabra et sericea, ad basim zona tenui annuliformi vel volviformi; caro modice crassa et fibrosa. Lamellae lanceolatae lamellulis numerosissimis, 0.8-12.5 mm longae, 1.0-3.0 mm latae, primo confertissimae, dein minus confertae, albae dein spadiceatrae, postremo atrae, autolysis completa.

Sporae laevae, ellipsoideae, apicibus staturae

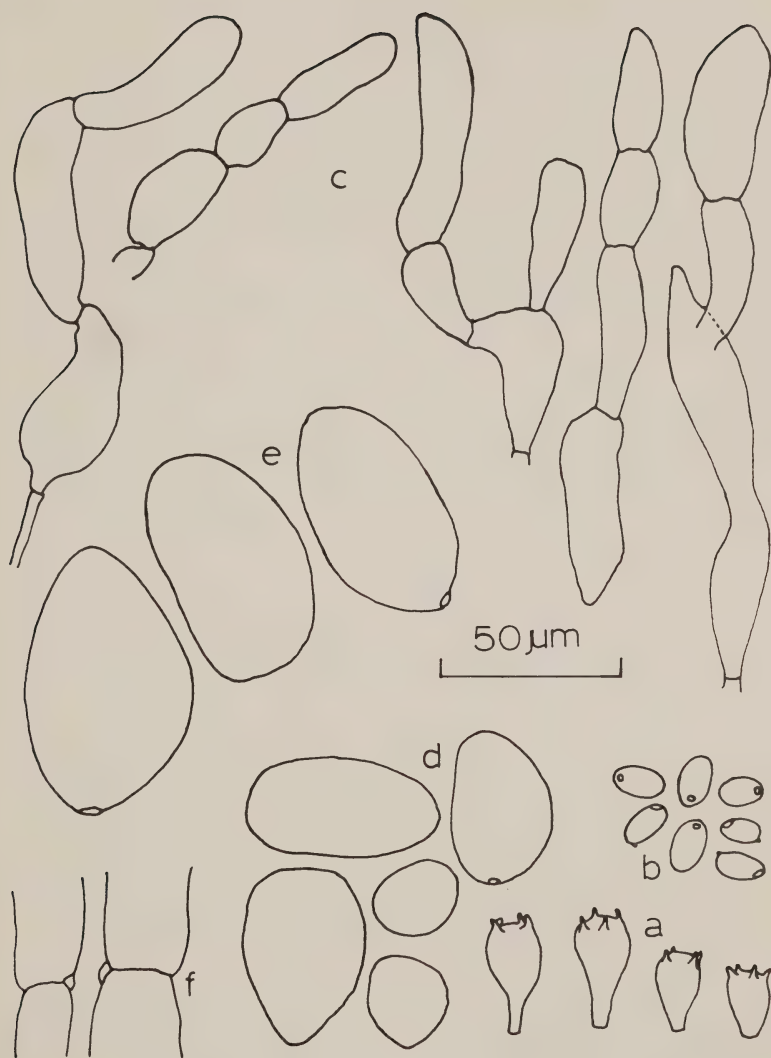


Fig. 8. *Coprinus alutaceivelatus* FVDB 2516, a. basidia, b. spores, c. universal veil, d. cheilocystidia, e. pleurocystidia, f. stipe clamp connections.

mediocris, pro parte maxima per transectionem rotundae, aliquot leviter complanatae, $8.7-11.3 \times 6.2-8.8 \times 6.2-7.5 \mu\text{m}$, poro germinationis excentrico $1.2 \mu\text{m}$ diam, in cumulo atrae, per microscopium primo purpureibrunneae dein cinereae. Basidia tetraspora dimorpha, basidia breviter clavata $20.0-22.5 \mu\text{m}$ longa, $12.5 \mu\text{m}$ crassa, basidia clavata $26.2-32.5 \mu\text{m}$ longa, $12.5-15.0 \mu\text{m}$ crassa. Cheilocystidia globosa vel ellipsoidea, $22.5-70.0 \mu\text{m}$ longa, $22.5-45.0 \mu\text{m}$ crassa, hyalina, tenuitunicata, glabra. Pleurocystidia ellipsoidea, $56.0-75.0 \mu\text{m}$ longa $35.0-44.5 \mu\text{m}$ crassa, numerosissima, in lamellis contiguais saepe per apicem inclusa, hyalina, tenuitunicata, glabra. Pagina pilei aliquantum cellulosa, sed cellulis omnibus radialiter elongatis. Contextus pilei in 3% KOH pallide luteibrunneus. Velum universale alutaceum, coactum, primo super paginam pilei continuum, mox in frustillis parvis irregularibus ruptum, e catenis plus minusve intertextis constante; cellulae catenarum cylindraceae vel magnopere tumidae, ad septa constrictae, raro ramosae, hyalinae, rasiles, tenuitunicatae, $2.5-23.0 \mu\text{m}$ crassae. Zona annuliformis ad basim stipitis e cellulis similaribus constans. Fibulae ad stipitem rarae.

Holotypus FVDB 2516, in solo et stramento foliorum coniferarum, sporocarpia laxe fasciculata, proxima Seattle in Comitatu King pagi Washingtonis 20 Octoberis 1973 lectus, in herbario Universitatis Washingtonis (WTU) conservatus.

PILEUS at first glandiform, then conical, then campanulate. Prior to expansion $1.0-2.0$ cm in length and after expansion $1.7-2.9$ cm in breadth. At first tan from universal veil tissue, apex under veil medium brown, with maturity pileus yellow-brown under the tan veil and apex brown under the veil remnants. Surface covered at first then plicate-striate under small felt-like irregular veil remnants. Flesh thin and membranous.

STIPE hollow, no mycelial web or thread present, very thin and slightly tapered towards the apex, $1.0-2.5$ cm $\times$ $2.0-3.0$ mm, white, opaque, surface glabrous and silky, faint annular or volval ring present at the base, flesh moderately thick and fibrous.

LAMELLAE lanceolate, lamellulae very numerous, $0.8-12.5 \times 1.0-3.0$ mm, at first very crowded, then less so. White, then brownish black, finally soot black.

Autolysis complete.

ODOR none. Taste not observed.

SPORES ellipsoidal, mostly round in cross-section, a few slightly flattened, $8.7-11.3 \times 6.2-8.8 \times 6.2-7.5 \mu\text{m}$, lacking a perisporium, apiculus of medium size and usually visible, germ pore eccentric, $1.2 \mu\text{m}$ diameter. Color en masse soot black, microscopically purple-brown becoming greyish in 3% KOH. Wall smooth.

BASIDIA dimorphic, short clavate and $20.0-22.5 \times 12.5 \mu\text{m}$, clavate and $26.2-32.5 \times 12.5-15.0 \mu\text{m}$, all four-spored.

CYSTIDIA: Cheilocystidia globose to short ellipsoidal, $22.5 \mu\text{m}$ in diameter to $70.0 \times 45.0 \mu\text{m}$, hyaline, thin walled, smooth. Pleurocystidia ellipsoidal, $56.0-75.0 \times 35.0-44.5 \mu\text{m}$, very numerous, mostly bridging between two opposing lamellae, hyaline, thin walled, smooth. No other cystidia present.

PILEAL SURFACE somewhat cellular but all the cells elongated in a radial direction.

PILEAL CONTEXT pale yellow-brown in 3% KOH.

UNIVERSAL VEIL felt-like and at first continuous over pileal surface, soon breaking up into small irregular patches, tan, composed of somewhat interwoven chains of cells. Cells cylindrical to greatly swollen, constricted at the septa, seldom branched, hyaline, smooth, thin walled. Cells $2.5-23.0 \mu\text{m}$ in diameter. Annular line at stipe base of similar cells.

CLAMP CONNECTIONS rare on stipe.

HABITAT terrestrial, on soil and conifer needle duff. Loosely clustered.

Observations: The tan color of the universal veil and yellow-brown pileal context are distinctive features of this species. The eccentric germ pore of this species and of C. bubalinus distinguish them from others of this section present in the western states.

Material Examined. Washington: HOLOTYPE, FVDB

2516*, 20 October, 1973.

9. Coprinus pachydermus VAN DE BOGART sp. nov.
(Fig. 9).

Pileus primo glandiformis, dein conicus, postea campanulatus, postremo revolutus et aliquantum laciniatus, primo 0.8-1.1 cm longus, post expansionem 3.0 cm latus, primo pallidicinereialbus et ad apicem brunneus, in maturitate atrans; pagina pilei leviter striata, glabra, laevis, primo velo universali oblecta; velum universale laxum, facile depulsandum et perdendum, hyalinum vel pallidibrunneum, fibroso-squamatum, squamae ubi novae guttulas parvas lucentibus ferentes. Caro tenuis et membranacea. Stipes cavus, tenuis et gracilis, e basim versus apicem leviter decrescens, 6.0-8.5 cm longus, 2.0-3.0 mm crassus, albus, leviter translucidus, pagina stipitis ad apicem leviter lanata vel sericea, ad basim gradatim lanat; caro tenuis et fragilis. Lamellae angustae lanceolatae, 4.0-10.0 mm longae, 2.0-3.0 mm crassae, librae et remotae, pallidae dein atrae; lamellulae adsunt; autolysis completa.

Sporae ellipsoideae, per transectionem fere rotundae, 10.0-11.5 x 6.0-6.4 μm , apiculo grandi, poro germinationis apicali, 1.2-1.4 μm diam; in cumulo atrae, per microscopium atrobrunneae, laeves, guttulam unam capientes. Basidia tetraspora, dimorphica, basidia breviter clavata 16.5 x 19.0 μm longa, 7.0-8.0 μm crassa, basidia longe clavata 25.0-27.5 μm longa, 7.5 μm crassa. Cheilocystidia verisimiliter adsunt, sed praecocissime diffluentia. Pleurocystidia sparsa, in pagina omni lamellarum ubique late disseminata, subglobosa et 45.0-50.0 μm diam, vel breviter ellipsoidea et 68.0 μm longa, 40.0-48.0 μm crassa, apicibus rotundus, hyalina, tenuitunicata, laevia. Pagina pilei e cellulis radiantibus constans. Velum universale e squamis parvis, albis, ascendentibus constans, quas e fasciculis catenarum cellularum, ellipsoidearum vel subcylindracearum constantibus, catenae cellularum saepe plus quam 1200 μm longae, singulae cellulae 50.0-210.0 x 10.0-45.0 μm , hyalinae, pro maxima parte aliquantum tumidae et ad septa constrictae, aliquae tenuitunicatae sed maximam partem tunicis usque ad 1.5 μm crassis, laevis, plerumque fibulatis, haud ramosis. Fibulae in velo universali, contexto pilei, insuper aliquot in pagina stipitis.

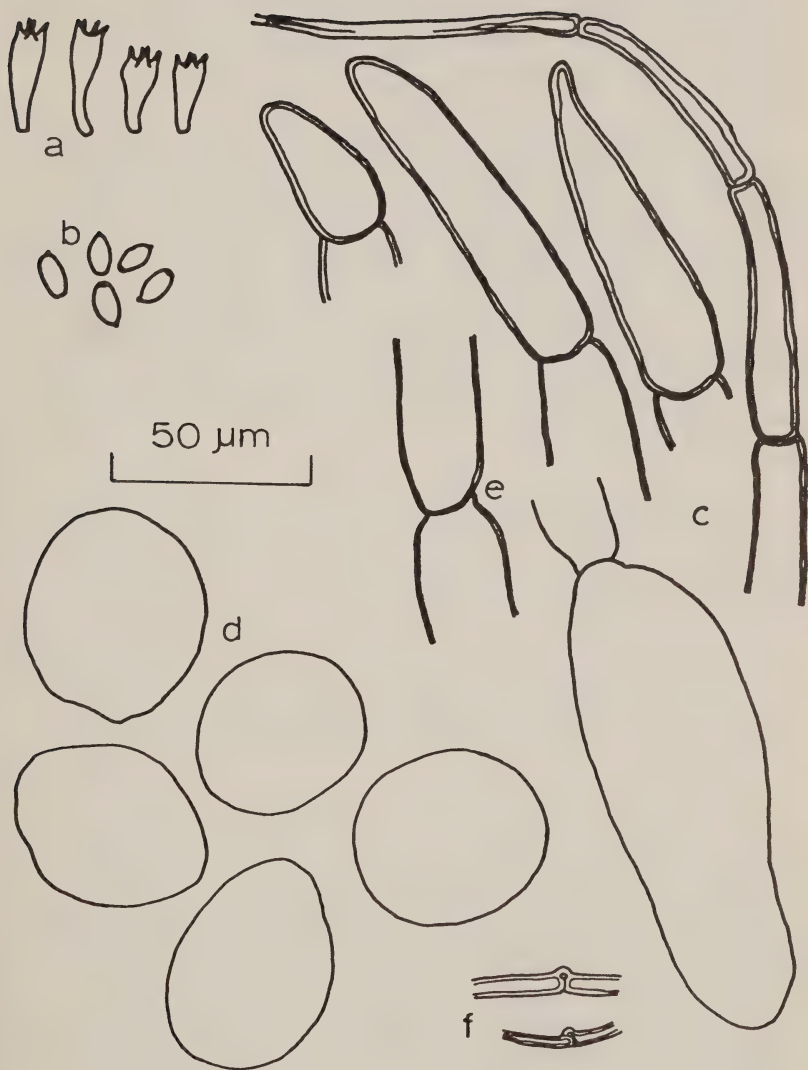


Fig. 9. *Coprinus pachydermus* FVDB 237, a. basidia, b. spores, c. universal veil, d. pleurocystidia, e. stipe clamp connection, f. universal veil clamp connections.

Holotypus FVDB 237, lignatilis, in turmis parvis in cumulo scobis putrescentis, in insula Foster dicta in arboreto Universitatis Washingtonis 5 Octoberis 1971 lectus, in herbario Universitatis Washingtonis (WTU) conservatus.

PILEUS glandiform at first, then conic, then campanulate, and finally revolute and somewhat laciniate. Prior to expansion 0.8-1.1 cm in length and after expansion 1.8-2.2 cm in breadth. Pale grey-white to medium brown at apex at first, then generally darkening as spores mature. Surface faintly striate, but very little plicate striation develops. Entire surface covered at first by a hyaline to pale brown fibrous-scaly universal veil, and when fresh small glistening drops are present. The universal veil is loosely attached and easily dislodged and lost. The true surface is smooth and glabrous. Flesh thin and membranous.

STIPE hollow, slender and thin, tapered slightly from base to apex, 6.0-8.5 cm x 2.0-3.0 mm. White, slightly translucent. Surface slightly wooly to silky at apex, becoming increasingly wooly towards the base. Flesh thin and fragile.

LAMELLAE narrowly lanceolate, some short lamellae present, 4.0-10.0 x 2.0-3.0 mm, free and remote, crowded and remaining so until destroyed by lysis, pale then black. Autodigestion destroys the entire pileus.

ODOR AND TASTE none.

SPORES ellipsoidal, nearly round in cross-section, 10.0-11.5 x 6.0-6.4 μm , lacking a perisporium, apiculus large and conspicuous, germ pore apical, 1.2-1.4 μm in diameter. Color en masse soot black, microscopically deep brown in 3% KOH. Spores mostly with one guttule. Walls smooth.

BASIDIA dimorphic, short clavate and 16.5-19.0 x 7.0-8.0 μm , long clavate and 25.0-27.5 x 7.5 μm , all four-spored.

CYSTIDIA: Cheilocystidia probably present but destroyed by lysis of lamellar margin. Pleurocystidia scattered widely over entire lamellar face, not plentiful, not bridging the interlamellar spaces, subglobose and 45.0-

50.0 μm in diameter or short ellipsoidal and 68.0 x 40.0-48.0 μm , apices rounded, hyaline, thin walled, smooth. No other cystidia present.

PILEAL SURFACE of radially oriented hyphae.

UNIVERSAL VEIL present on pileus as small white upturned loose scales composed of bundles of chains of ellipsoidal to subcylindrical cells, the chains of cells often exceeding 1200 μm in length. Individual cells 50.0-210.0 x 10.0-45.0 μm in size, hyaline, mostly somewhat swollen and constricted at the septa, some of them thin walled but most with walls up to about 1.5 μm thick, smooth, usually with clamp connections, unbranched.

CLAMP CONNECTIONS present on the universal veil, in the pileal trama, and also (a few) on the stipe surface.

HABITAT lignicolous or sublignicolous, on an open compost pile of rotting wood chips and sawdust. In loose groups.

Observations: The exceptionally thick walls of most of the cells of the universal veil and the short subglobose pleurocystidia are distinctive.

Material Examined. Washington: HOLOTYPE, FVDB 237*, 5 October, 1971.

10. Coprinus tectisporus VAN DE BOGART sp. nov.
(Fig. 10).

Pileus primo elongato-glandiformis dein conicus, postea campanulatus, postremo revolutus, primo 1.0-1.4 cm longus, post expansionem 1.0 cm latus, primo pallidus et fere albus, dein cinereus et squamas albas ferens, ad apicem atrogriseus, in maturitate plicato-striatus; pagina pilei primo velo universali alba fibrillosa obtecta, velum universale ex fibrillis parallelis constans, per expansionem pilei in squamis parvis, laxis, albis, recurvatis rum-pens et pagina laevis et glabra pilei ergo expositur; caro tenuis et fragilis etiam ad apicem. Stipes cavus, gracilis, 4.0-5.0 cm longus, 1.5-3.0 mm latus, aliquantulum ad basim tumidus et in substrato usque ad 1.0 cm insertus, e basi ad apicem angustatus, basis annulo fibrillae ornata,

quo locum monstrat, ubi margo pilei inexpandi affixus fuit, pagina alba, impellucida, minute fibrillosa fere usque ad apicem; caro tenuis et fragilis. Lamellae lanceolatae, 0.4-1.3 cm longae, 3.0 mm latae, librae vel annexae, primo creberrimae dein minus confertae, pallidae dein purpureiatrae; lamellae aliquot adsunt; autolysis completa.

Sporae ellipsoideae, per transectionem rotundae, 10.9-15.0 x 7.5-8.8 μm , poro germinationis apicali, 2.4-2.6 μm diam; in cumulo purpureiatrae, per microscopium atropurpureae vel fere atrae et impellucidae, crassitunicatae, tunica 1.8-1.9 μm crassa, primo in 3% KOH rasilitunicata, demum post intervallum brevem et pressione leni, perisporium laxum et pallidibrunneum depulsum est. Basidia tetraspora, dimorphica, basidia clavata 18.0-23.0 μm longa, 10.0 μm crassa, basidia ululiformia 28.0-31.5 μm longa, 10.0 μm crassa. Cheilocystidia proparte maxima globosa et 18.5-39.0 μm diam, aliquot ellipsoidea et 40.0 μm longa, 20.0 μm crassa, rasilitunicata, hyalina. Pleurocystidia late ovata vel ellipsoidea, 77.5-137.7 μm longa, 42.5-55.0 μm crassa, numerosissima, rasilitunicata, hyalina. Pagina pilei ex hyphas cylindraceas radiantes constans. Velum universale ad paginam pilei pro squamis quibus catenarum cellularum laxae aggregatis constans, et ad basem stipitis pro fimbria catenarum cellularum similaribus; cellulae in quoque catena maximam partem tumidae et ad septis constrictae sed cellulae aliquot cylindricae et haud tumidae; cellulae omnes tenuitunicatae, laeves, hyalinae, 37.5-313.0 x 5.0-52.5 μm . Fibulae in velo universali, in trama lamellarum, et sparse in stipite.

Holotypus FVDB 2171, solitarius vel fasciculatus in solo tepidarii ad Universitate Washingtonis, Seattle, comitato King pagi Washingtonis, Martii 1950 lectus, in herbario Universitatis Washingtonis (WTU) conservatus.

PILEUS at first long glandiform, then becoming conic, then campanulate and finally revolute. Prior to expansion 1.0-1.4 cm in length and after expansion 1.0 cm in breadth. Pale whitish at first then becoming grey with whitish scales, apex becoming dark grey. Fine plicate striations develop as pileus expands. Surface at first covered with a white fibrillose universal veil composed of parallel fibrils which soon breaks up into small, loose, white, recurved scales, exposing the smooth, glabrous surface. Flesh thin and fragile even at the apex.

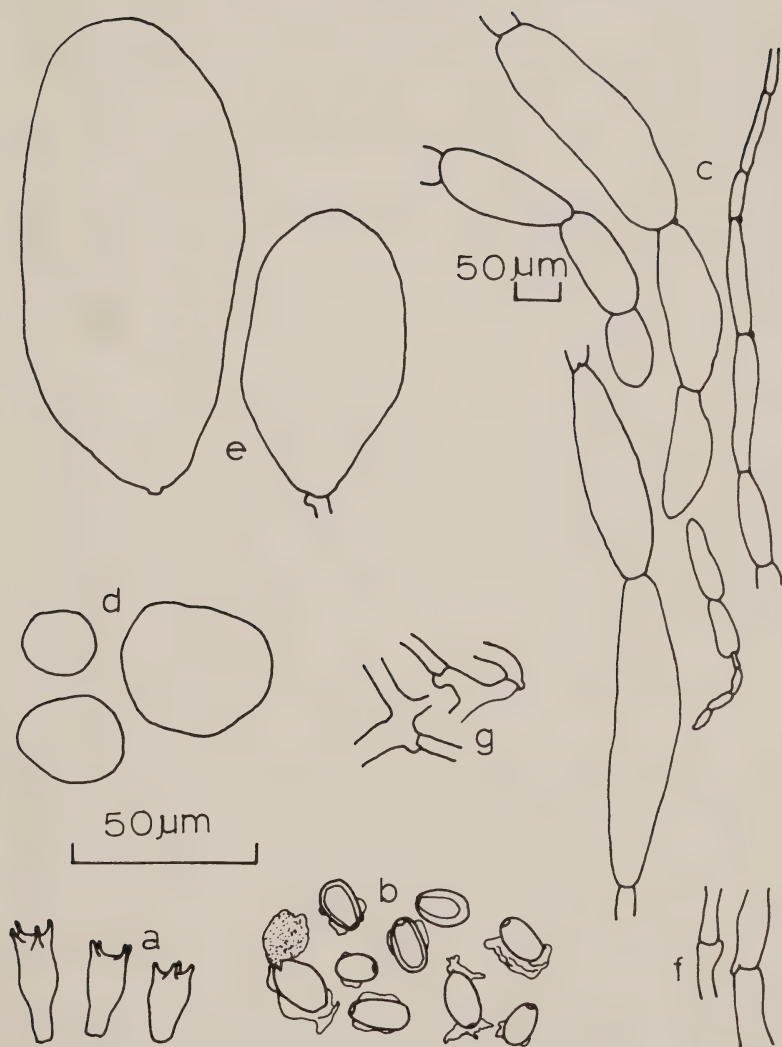


Fig. 10. *Coprinus tectisporus* FVDB 2171, a. basidia, b. spores, c. universal veil, d. cheilocystidia, e. pleurocystidia, f. stipe clamp connections, g. lamellar trama clamp connections.

STIPE hollow, slender, 4.0-5.0 cm x 1.5-3.0 mm, enlarged at the base somewhat and inserted into substrate about 1.0 cm, tapering from base to apex, base ornamented with a ring of fibrils marking the site of attachment of the margin of the unexpanded pileus. Surface minutely fibrillose almost to apex, white and opaque. Flesh thin and fragile.

LAMELLAE narrowly lanceolate, some lamellulae present, 0.4-1.3 cm x 3.0 mm, free and close to adnexed, extremely crowded at first, then less crowded as plicate striation develops when pileus expands, pale then deep purplish black. Autodigestion complete.

ODOR AND TASTE not observed.

SPORES ellipsoidal, round in cross-section, 10.9-15.0 x 7.5-8.8 μm , apiculus medium sized and generally visible, germ pore apical, 2.4-2.6 μm in diameter. Color en masse deep purplish black, microscopically deep purple to almost opaque black in 3% KOH. Walls thick, 1.8-1.9 μm , smooth when first mounted in 3% KOH, then, after some minutes soaking and gentle pressure on the coverglass, a loose brownish perisporium may be dislodged.

BASIDIA dimorphic, clavate and 18.0-23.0 x 10.0 μm , ululiform 28.0-31.5 x 10.0 μm , all four-spored.

CYSTIDIA: Cheilocystidia mostly globose but some ellipsoidal cells also present, globose and 18.5-39.0 μm in diameter, ellipsoidal and 40.0 x 20.0 μm , smooth, thin walled, hyaline. Pleurocystidia broadly ovate to ellipsoidal, very numerous, 77.5-137.5 x 42.5-55.0 μm , hyaline, thin walled, smooth. No other cystidia present.

PILEAL SURFACE of radially oriented cylindric hyphae.

UNIVERSAL VEIL present on pileus as scales composed of loosely aggregated chains of cells, and at the base of the stipe as a fringe of similar chains of cells. Most cells in each chain are swollen and constricted at the septa, some cells cylindrical and not swollen, all thin walled, smooth, hyaline, 37.5-113.0 x 5.0-52.5 μm .

CLAMP CONNECTIONS present on universal veil, in

lamellar trama, and a few in the stipe.

HABITAT terrestrial, on soil mix in a greenhouse, solitary or in loose clusters.

Observations: The perisporium and thickness of the spore wall are distinctive features of this species.

Material Examined. Washington: HOLOTYPE, FVDB 2171, March 1950.

11. Coprinus fimetarius Linn. per Fr., Epicrisis, p. 245, 1838. (Fig. 11).

PILEUS at first long glandiform, then conical, then campanulate and finally revolute and usually somewhat lacinate prior to complete lysis. Prior to expansion 0.2-3.0 cm in length and after expansion 0.3-2.4 cm in breadth, eventually always about 0.1 to 0.4 cm due to pileal lysis. Dingy greyish white or greyish brown at first with a cuticular layer of white or dark greyish brown and often remaining brownish at apex until lysis. Some plicate striation develops as the pileus expands. Surface covered at first by white universal veil which soon breaks up into loose, somewhat upturned scales, the actual surface being smooth and glabrous. Flesh thin and fragile.

STIPE hollow, slender, tapering from base to apex, 1.5-15.0 cm x 0.5-4.0 mm, base often slightly enlarged and usually with an obscurely scaly or tomentose area that sometimes forms a vague annular zone where the margin of the unexpanded pileus rested on the stipe. Surface mostly smooth and glabrous except for the tomentum on the base, white and opaque, or subtranslucent in smaller specimens. Flesh thin and fragile.

LAMELLAE narrowly lanceolate, mostly or entirely elongate, 0.2-2.8 cm x 2.0-5.0 mm, free, crowded and then less so as pileus expands and plicate striation develops, white, then brownish, then finally soot black. Autodigestion complete.

ODOR AND TASTE none.

SPORES oblong-ellipsoidal, occasionally slightly reniform in lateral view, round in cross-section, 10.0-

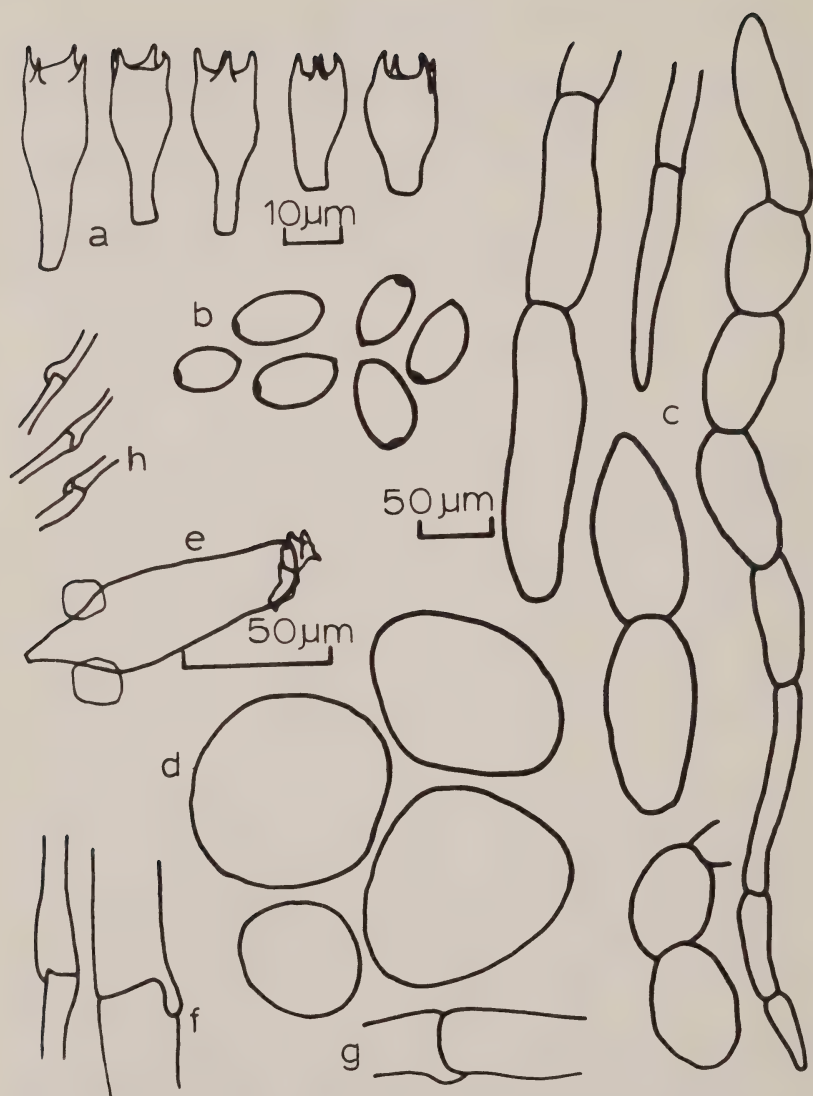


Fig. 11. *Coprinus fimetarius* FVDB 41, a. basidia, b. spores, c. universal veil, d. cheilocystidia, e. pleurocystidia, f. stipe clamp connections, g. universal veil clamp connection, h. lamellar trama clamp connections.

15.6 x 6.2-9.2 μm , lacking a perisporium, apiculus small to large and usually visible, germ pore apical, (0.4-)1.3-2.3 μm in diameter. Color in masse soot black or deep purplish black or deep brownish black, microscopically deep purple or deep brown or opaque black in 3% KOH. Walls smooth.

BASIDIA trimorphic, short clavate and 15.0-18.5 (-22.5) x 8.8-10.0(-12.5) μm , long clavate and 22.5-25.0 (-27.5) x 8.8-10.0(-12.5) μm , subululiform or ululiform and 27.5-37.5 x 8.8-10.0(-12.5) μm , all four-spored.

CYSTIDIA: Cheilocystidia mostly globose 12.5-44.0 μm in diameter, a few ellipsoidal cells sometimes present 42.5 x 20.0 μm , smooth, thin walled, hyaline, often largely fused together and uniting adjacent lamellae. Pleurocystidia long ellipsoidal, 50.0-90.0 x 12.5-35.0 μm , apices generally rounded but occasionally lageniform, bridging interlamellar spaces, smooth, thin walled, hyaline, very numerous. No other cystidia present.

PILEAL SURFACE of radially oriented hyphae.

UNIVERSAL VEIL of scales on pileus, each scale composed of parallel chains of cells. Similar chains of cells make up the tomentum at the stipe base. The cells of these chains are swollen and constricted at the septa, thin walled, hyaline, smooth, and almost entirely unbranched, 62.0-200.0 x 5.0-63.0 μm .

CLAMP CONNECTIONS present on universal veil, on pileal surface, on stipe surface, and in pileal and lamellar trama.

HABITAT coprophilous or subcoprophilous, on herbivore dung and rotting hay and straw. Solitary to loosely clustered.

Observations: Confusion over the identity and name of this species and C. macrorrhizus, C. lagopus, and C. cinereus apparently has existed since the earliest attempts at solving the taxonomy of these similar-appearing taxa.

Of these four coprophilous taxa, of which I consider several to be synonymous, C. fimetarius is the first one described by Fries in *Epicrasis* (1838), and hence is the name accepted here as having priority for the species.

Buller (1924, 1934) accepted the name of C. lagopus for this species and considered C. fimetarius and C. cinereus to be synonyms. Against Buller's usage of these names, however, are the facts that C. cinereus was used for the common woodland (lignicolous?) species by S. F. Gray (1821), and in the *Epicrisis* C. fimetarius takes precedence over C. lagopus by page priority.

Coprinus macrorhizus has been accepted by some as a valid species, by others as a variety of C. fimetarius, and by still others it is considered synonymous with C. fimetarius or whatever name they happened to use for the common coprophilous taxon. Buller (1924, 1931, 1934) considered C. fimetarius (as C. lagopus) and C. macrorhizus to be two separate species and cites one obscure reference (1931, p. 193) of monospore culture incompatibility but his list of comparative features consists largely of rather minor differences and leaves room for doubt about the specific nature of C. macrorhizus. The problem of the status of the pseudorhiza-forming taxon probably will not be solved until monosporic cultures of it are used again in compatibility tests with monosporic cultures of the more common taxa readily assigned to C. fimetarius.

One collection, FVDB 1721, differed from the others of this taxon in that its pileal surface became gelatinized and even viscid prior to autodigestion, and the basidia were markedly larger than those of the other collections. Also the germ pore of the spores of this collection were markedly smaller (0.4-1.0 μ m in diameter) than those of the other collections.

Material Examined. Washington: FVDB 41*, 88, 126, 209, 212, 278, 280, 283, 1719, 1721, 2125, 2130.

12. Coprinus macrorhizus Pers. per Rea, Brit. Basid., p. 503, 1922. var. macrorhizus (Fig. 12).

PILEUS at first glandiform, then conic, then campanulate, and finally revolute, prior to expansion 1.0-3.6 cm in length and after expansion 1.5-4.0 cm in breadth. At first mostly white to grey-white and pale brown or yellow-brown at the apex with a thin loose layer of white fibrillose or somewhat scaly universal veil, then becoming dark grey or dark grey-brown especially at the apex. Some plicate striation develops. Surface under the univer-

sal veil smooth and glabrous, lubricous when fresh.
Flesh thin and fragile.

STIPE hollow, slender, tapered from the somewhat enlarged base to the apex, 6.0-23.5 cm x 1.0-6.5 mm, of which up to 8.0 cm or more may consist of a radicating process that arises at the base and usually penetrates the substratum 2.0-8.0 cm or more. The radicating process is more fleshy than the exposed portion of the stipe and may be almost solid with little or no lumen. Surface smooth and glabrous to thinly fibrillose, especially at the enlarged base where the unexpanded pileal margin was attached. Flesh somewhat fibrous but also rather thin and fragile.

LAMELLAE lanceolate, mostly full length, 0.8-3.4 cm x 3.0-6.0 mm, free, crowded at first then less so as some plicate striation develops when pileus expands, white, then pale brown, then brownish black to purplish grey, and finally soot black. Autodigestion complete.

ODOR AND TASTE none.

SPORES broadly ellipsoidal, round in cross-section, 12.5-15.6 x 7.7-8.8 μm , apiculus large and visible unless obscured by opacity of the spore wall, germ pore apical, 1.4-1.9 μm in diameter. Color en masse dark brownish black to soot black, microscopically dark purplish black to almost opaque with a faint purple tint in 3% KOH. Walls smooth.

BASIDIA dimorphic, short clavate and 17.5-22.5 x 8.5-10.0 μm , long clavate to subululiform and 27.1-37.8 x 7.4-12.6 μm , all four-spored.

CYSTIDIA: Cheilocystidia continuous with and resembling the brachybasidioles of the hymenium although larger, 15.0-25.0 μm in diameter, roughly globose or at least subisodiametric. In an immature pileus these brachybasidioles or cystidiumlike cells form a continuous membrane from one lamella to the adjacent one and thus form a temporary closed interlamellar space. Pleurocystidia ellipsoidal, bridging, with the cell apex usually deeply embedded in the opposing lamella and, if forcibly dislodged, carrying away with it cell wall fragments from the opposing lamella, 62.5-88.0 x 26.8-42.8 μm , hyaline, thin walled, smooth, very abundant. No other cystidia

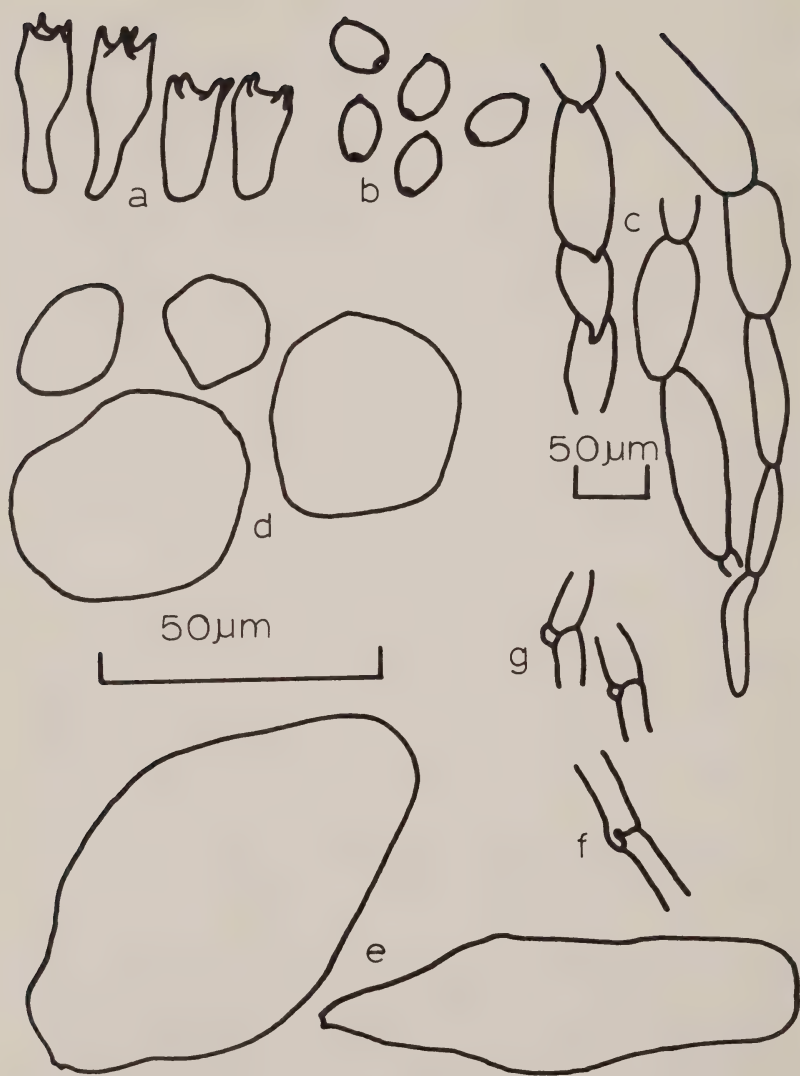


Fig. 12. Coprinus macrorrhizus var. macrorrhizus FVDB 141, a. basidia, b. spores, c. universal veil, f. pileal trama clamp connection, g. lamellar trama clamp connections, FVDB 1893, d. cheilocystidia, e. pleurocystidia.

present.

PILEAL SURFACE of radially oriented cylindrical hyphae. In one collection (FVDB 1893) there is a layer of pigmented cells in the pileal trama.

UNIVERSAL VEIL mostly on pileus as white scales and fibrils composed of long chains of cylindrical to ellipsoidal cells, $12.5-74.6 \times 5.0-54.0 \mu\text{m}$, swollen, constricted at the septa, thin walled, hyaline, smooth, unbranched, usually with a clamp connection at each septum, the individual chains of cells about $1400 \mu\text{m}$ long. Often some universal veil cells or chains of cells also present on stipe base.

CLAMP CONNECTIONS present on universal veil, on stipe, and sometimes in lamellar trama.

HABITAT coprophilous or subcoprophilous, on rotting hay, straw, horse dung, and on a synthetic fly larva medium. Solitary or in loose clusters.

Observations: As mentioned previously, this taxon may be synonymous with C. fimetarius. However, the few morphological differences, such as smaller size of universal veil cells, the presence of a radicating process on the stipe and the dimorphic basidia, seem to be constant.

Material Examined. Washington: FVDB 141*, 1893*.

13. Coprinus macrorhizus var. microsporus (Hongo)
Van De Bogart, nov. stat., (Fig. 4)

Basionym: C. macrorhizus Rea f. microsporus
Hongo, Journ. of Japanese Bot., 27: 161, 1952.

As described in variety macrorhizus except that the spores are smaller ($7.5-11.2 \times 5.0-6.9 \mu\text{m}$), and the pileal apex is yellowish.

Material Examined. Washington: FVDB 115*.

14. Coprinus cinereus Schaeff. per S. F. Gray, Nat.
Arr. Brit. Plants, p. 634, 1821. var. cinereus
(Fig. 13).

PILEUS at first long glandiform, then conic, then campanulate, and finally revolute and laciniate, prior to expansion 1.5-3.5 cm in length and after expansion 2.0-6.0 cm in breadth. At first white to pale brown (and darker brown at apex) under a white universal veil layer, then becoming dark grey to grey-brown as the spores mature. Striate from the first, then becoming deeply plicate-striate. Surface under the universal veil smooth and glabrous and lubricous when fresh. Universal veil of fibrils and scales, loose and easily lost. Flesh thin and fragile.

STIPE hollow, slender, often somewhat enlarged at base, tapered from base to apex, 5.0-18.0 cm x 1.7-7.0 mm. White and opaque to slightly translucent in small specimens. Surface sometimes smooth and glabrous but often with strigose woolly fibrils at the base of the stipe. Flesh thin and fragile especially when fully expanded.

LAMELLAE narrowly lanceolate, sometimes with numerous lamellulae also present, 0.5-3.3 cm x 1.0-6.0 mm, free to adnexed, crowded at first then less so as plicate striation develops when pileus expands, pale, then brownish, and eventually soot black. Autodigestion consumes most or all of the pileus.

ODOR AND TASTE none.

SPORES ellipsoidal, round in cross-section, 9.0-15.0 x 5.6-8.1 μm , apiculus small but usually visible, no well-defined suprahilar flattening, germ pore apical, 1.5-2.7 μm in diameter. Color en masse deep brownish black to soot black, microscopically deep chestnut brown to deep purple-black or almost opaque in 3% KOH. Contents sometimes guttulate, sometimes not. Wall smooth.

BASIDIA trimorphic, short clavate and 17.5-22.0 x 8.0-11.2 μm , long clavate to subululiform and 26.0-31.2 x 8.5-11.2 μm , ululiform and 32.0-37.5 x 8.1-11.2 μm , all four-spored.

CYSTIDIA: Cheilocystidia somewhat variable, some globose, some broadly ovate, and some ellipsoidal, globose, 18.7-65.0 μm in diameter, broadly ovate to ellipsoidal, 48.0-112.5 x 16.0-75.0 μm , smooth, thin walled, hyaline. The cheilocystidia tend to be fused into a membrane uniting adjacent lamellae. Pleurocystidia ellipsoidal,

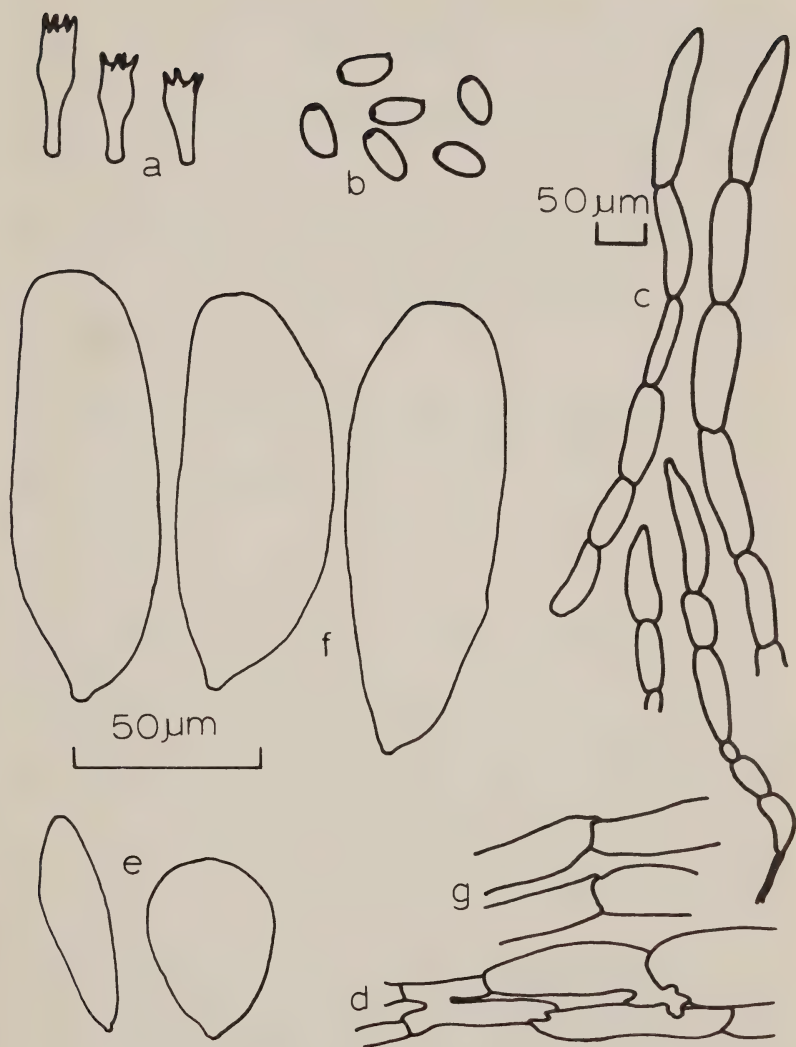


Fig. 13. *Coprinus cinereus* var. *cinereus* FVDB 1740, a. basidia, b. spores, e. cheilocystidia, f. pleurocystidia, FVDB 244, c. universal veil, d. universal veil, g. universal veil clamp connections.

108.0-192.5 x 40.0-95.0 μm , often with a short pedicel 2.0-4.0 μm in length, smooth, thin walled, hyaline, bridging. No other cystidia present.

PILEAL SURFACE composed of cells elongated in a radial orientation but bearing some resemblance to the cellular type.

UNIVERSAL VEIL present on pileus and often on stipe base as fibrils and scales that are composed of chains of usually swollen cells, constricted at the septa, (often with clamp connections) hyaline, thin walled, smooth, unbranched. Individual cells 30.0-350.0 x 7.0-56.0 μm .

CLAMP CONNECTIONS present on universal veil, on stipe, in pileal trama, and in lamellar trama.

HABITAT lignicolous or seemingly terrestrial (but on buried wood?), on soil, forest litter, wood chips, hardwood sticks, twigs, and stumps. Solitary or in loose clusters.

Observations: S. F. Gray (1821) indicated that the taxon to which he assigned the name of C. cinereus was this common (usually?) woodland lignicolous species. C. cinereus resembles the coprophilous C. fimetarius in almost every detail except substrate and habitat, so monospore cultures of C. cinereus should be confronted with those of C. fimetarius to determine if they are compatible or not.

Material Examined. Washington: FVDB 33, 34, 43, 51, 57, 187, 202, 203, 227, 244*, 250, 1123, 1729, 1740*. British Columbia: 2193.

15. Coprinus cinereus var. depressus VAN DE BOGART var. nov. (Fig. 4).

A typo differt sporis depressionam suprahilarem conspicuam praebentibus.

Holotypus FVDB 264 ad ligno carioso Pruni emarginati (Dougl.) Walp. in sylva Lee dicta in comitato Snohomish pagi Washingtonis 25 Octoberis 1971 lectus, in herbario Universitatis Washingtonis (WTU) conservatus.

As described in variety cinereus except that the spores have a conspicuous suprahilar depression. Also collection FVDB 264 appears to be attached to slender black compact rhizomorphs which may belong to another fungus, such as Armillariella mellea, and the other collection (FVDB 261) has some of the cells of the universal veil with walls up to 0.5 μ m thick.

Material Examined. Washington: HOLOTYPE, FVDB 264*, 25 October 1971; FVDB 261.

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CORYNASCELLA INQUINATA, A NEW CLEISTOTHECIAL ASCOMYCETE FROM SEWAGE SLUDGE

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During microbiological studies on the environmental pollution in the Nagasaki Prefecture, southwestern Japan, an undescribed species of *Corynascella* was encountered colonizing a plate of sewage sludge.

Corynascella inquinata Udagawa & Ueda, sp. nov.
(Figs. 1-3)

Coloniae in agaro farina avenae mixto satis effusae, floccosae, planae, dilute olivaceo-griseae. Mycelium hyalinum vel dilute olivaceo-brunneum, e hyphis ramosis, septatis, laevibus vel asperatis, saepe anastomosantibus compositum.

Ascocarpi plerumque superficiales, dispersi vel aliquantum congregati, profunde olivaceo-brunnei vel nigriores, globosi vel subglobosi, vulgo 185-300 μm diam, pilosi, nonostiolati; pili ascocarparum numerosi, recti vel flexuosiores, rigidi, septati, dilute olivaceo-brunnei, simplices vel superne pauciramosi, usque 250-600 μm longi, ad medium 2.5-3.0 μm diam, aspri, superne gradatim contracti. Peridium tenue, membranaceum, primum semitranslucens, deinde laete olivaceo-brunneum, 4.0-8.0 μm crassum; stratum exterius e cellulis elongatis, incrassatis, 2.0-5.0 μm latis compositum; stratum interius e cellulis hyalinis, angularibus, 3.5-10.0 μm diam compositum. Asci octospori, late clavati, 60-75 $\times$ 24-26 μm , brevistipitati, fasciculati, evanescentes; paraphyses nulli. Ascosporae biseriatae vel multiseriatae, primum hyalinae et guttulae, deinde olivaceo-brunneae vel profunde olivaceo-brunneae, opacae, unicellulares, late ellipticae, (15-)18-21(-23) $\times$ (12-)13-15 (-16) μm , laeves, interdum vesiculam magnam continentes, in extremis 1-2 poris germinationis praeditae, circa quos paries inspissatus. Conidia incognita.

Holotypus: 2841, NHL, isolatus e limo (sewage sludge) in Japonia, 22.iii.1978, S. Ueda.

Etymology: *inquinatus* = polluted, referring to the nature of the habitat.

Colonies on oat-meal agar growing fairly rapidly, attaining a diam of 2.5 to 3.0 cm in 2 weeks at 23 C, floccose, plane, consisting of a thin basal felt of fine hyphae

with surface producing abundant ascocarps, pale olivaceous grey (Rayner, 1970); reverse smoke grey to grey olivaceous (Rayner, 1970).

Mycelium hyaline to pale olive brown, composed of branched, septate, smooth to roughened, often anastomosed hyphae measuring 1.0-5.0 μm in diam; ascocarp initials produced as swollen side branches from the hypha, then many-branched, inflated, and tightly intertwined with each other.

Asocarps usually superficial, scattered or clustered in small groups, dark olivaceous brown to nearly black, globose to subglobose, mostly 185-300 μm in diam, hairy, nonostiolate; ascocarp hairs numerous, scattered over the ascocarp, straight or somewhat flexed, stiff, septate, pale olivaceous brown, simple or a few branched above, up to 250-600 μm long, 2.5-3.0 μm wide at the middle, usually roughened by conspicuous granules, tapering gradually to a pale-colored, rounded or pointed tip. Peridium thin, membranaceous, semitransparent when young, light olivaceous brown at maturity, 4.0-8.0 μm thick; outer layer 'textura epidermoidea', consisting of elongate, thick-walled cells measuring 2.0-5.0 μm wide; inner layer 'textura angularis', consisting of hyaline, angular cells measuring 3.5-10.0 μm in diam. Asci 8-spored, broadly clavate, 60-75 $\times$ 24-26 μm , rounded above, with no apical ring visible, tapering below into a short stipe up to 8.0 μm long, borne from croziers in a fascicle, evanescent; paraphyses lacking. Ascospores biseriate or multiseriate, at first hyaline and conspicuously guttulate, then becoming olive brown to dark olive brown, opaque, one-celled, broadly ellipsoidal, often flattened at one side, 15-23 $\times$ 12-16 μm (mostly 18-21 $\times$ 13-15 μm), smooth-walled, sometimes with a prominent bubble, provided with a germ pore at one or each end, around which the spore wall is conspicuously thickened; germ pores hyaline, circular, 2.0-3.0 μm in diam. Conidia unknown.

At 37 C, growth is nil.

Holotype - No. 2841, NHL, isolated from sewage sludge, Isahaya-shi, Nagasaki-pref., Japan, March 22, 1978, S.Ueda.

The genus *Corynascella* was erected in 1975 by von Arx for a single species *C. humicola* von Arx & Hodges and is characterized by the presence of hairy cleistothecia and ascospores which have two germ pores and a strikingly thickened wall around the germ pores. Almost immediately after the above, von Arx (1975) transferred *Thielavia inaequalis* Pidoplichko, Kirilenko & Zakharchenko (1973) to this genus as a second species. These two species are separable on the basis of differences in the size of the asci and ascospores, and in the shape of the ascospores. The ascospores of *C. humicola* are 13-17 $\times$ 9-14 μm while those of *C. inaequalis* are 13.5-15.5 $\times$ 6-7.5 μm . The ascospores of the former species are ellipsoidal to nearly spherical or reniform while those of the latter species have been described as fusiform-ellipsoidal and often inequilateral.

Corynascella inquinata differs from them in producing long ascocarp hairs, and larger asci and ascospores in which the germ pore is frequently located only at one end.

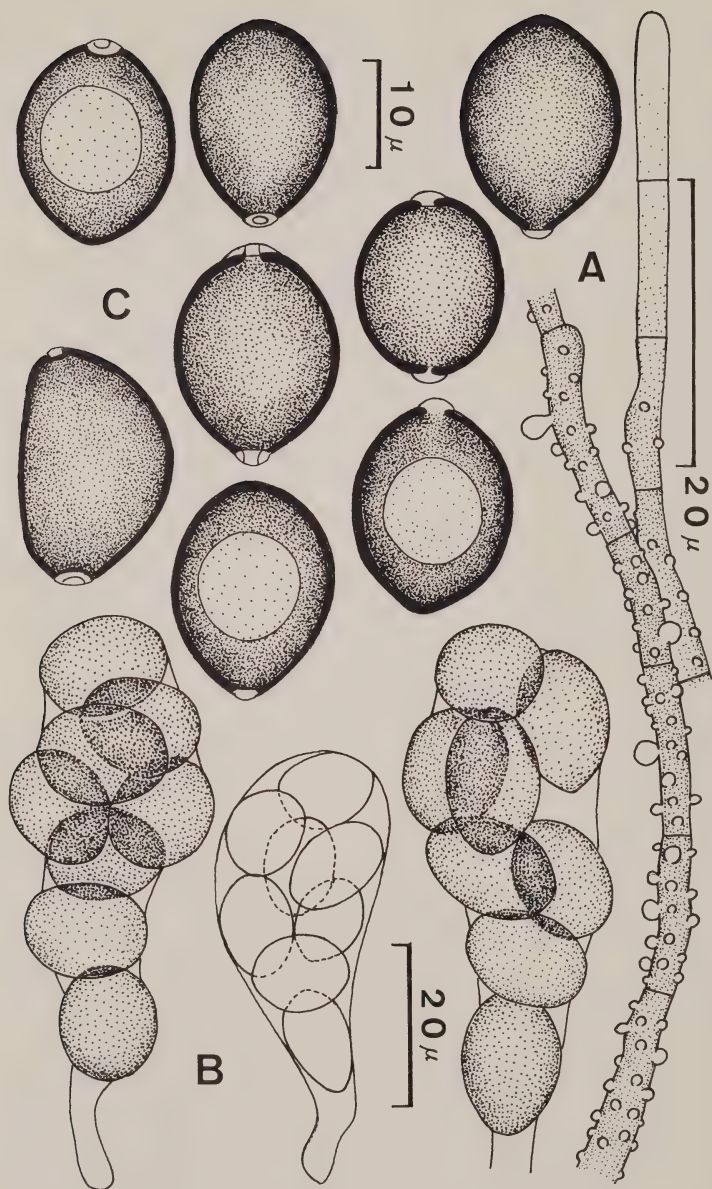


Figure 1. *Corynascella inquinata* Udagawa & Ueda.
A. Ascocarp hairs. B. Asci. C. Ascospores.



Figures 2 and 3. Corynascella inquinata. Ascospores in two different magnifications; 2, $\times 550$ and 3, $\times 1,000$, respectively.

It can be separated from C. humicola, a microthermophile, by its mesophilic growth temperature. Two species of Thielavia, T. wareingii Seth (1974) and T. ovalispora Lodha (1974), which may be conspecific, are most closely related to Corynascella. In both of these species, the ascospores are distinctly smaller.

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GLOMUS GERDEMANNII SP. NOV.

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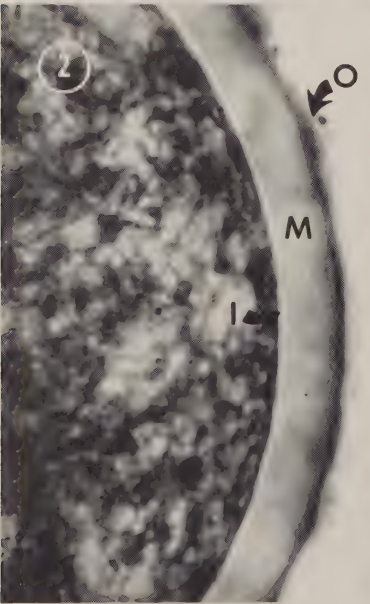
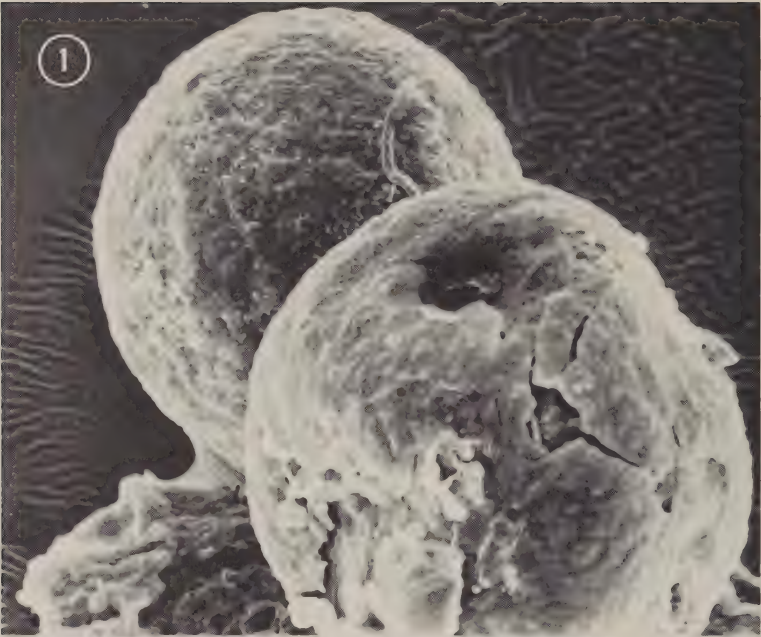
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GLOMUS GERDEMANNII Rose, Daniels & Trappe sp. nov.

Figs. 1-3

Spores globosae, subglobosae, vel ellipsoideae, 140-198 x 149-230 μm , juventute hyalinae, laeves, deinde pallide avellaneae, asperae. Spores tunica 5-10(-13) μm crassa, stratis quinque: exteriore 0.5-1.0 μm crasso, hyalino; secundo 2-5 μm crasso, hyalino, lamellato; tertio 1-2 μm crasso, hyalino, secedenti; quarto ± 0.1 μm crasso, hyalino; interiore 2-3 μm crasso, luteo. Hypha affixa recta, 7-12 μm diam, hyalina.

Spores naked, formed singly or in loose clusters or small sporocarps in soil, globose to subglobose or ellipsoid, 140-198 x 149-230 μm (broader than long when not globose), hyaline and smooth in youth, becoming pale yellow brown and roughened with age. *Spore walls* 5-10(-13) μm thick, of 5 layers: the outermost ± 0.5 -1.0 μm thick, hyaline, and smooth in youth, with age becoming roughened and cracked and flaking away in pieces; the 2nd layer inward 2-5 μm thick, hyaline and fused-laminated in youth,



with age becoming pale yellowish brown and degrading progressively inward to flake away as amorphous pieces of laminations; the 3rd layer inward 1-2 μm thick, hyaline smooth, separable; the 4th layer inward $\pm 0.1 \mu\text{m}$ thick, hyaline, adherent to the 5th and innermost layer 2-3 μm thick and yellow. *Spore contents* of hyaline oil globules 7-25(-50) μm diam. *Attached hypha* straight, readily detaching, 7-12 μm diam, hyaline, the walls thickened a short distance from the point of attachment, occluded by thickening of the 2nd spore layer. Reaction to Melzer's reagent not distinctive.

DISTRIBUTION AND HABITAT: Cascade Range and Siskiyou Mountains of Oregon on volcanic soils in climatically stressed and pioneer sites.

MYCORRHIZAL ASSOCIATIONS: Associated in the field with vesicular-arbuscular mycorrhizae of *Ceanothus velutinus* Dougl., *C. prostratus* Benth., and *C. integerrimus* Hook. & Arn.; forming mycorrhizae in pot culture with *C. velutinus*. No other host genera have been discovered thus far.

ETYMOLOGY: In honor of Dr. James W. Gerdemann for his contributions to knowledge of the Endogonaceae, particularly those of Oregon.

COLLECTIONS EXAMINED: TYPE: OREGON, Deschutes Co., ca. 1 km north of Benham Falls at Fort Benham, elev. 1100 m, July 1976, 15 cm deep in soil under *Ceanothus velutinus* Dougl. Rose S101(OSC).

Figs. 1-3. *Glomus gerdemannii*. 1. Two spores by scan electron microscopy; the foreground spore shows the outer wall layer cracked and separating from the adjacent inner layer. $\times 425$. 2. Young spore in cotton blue-lactophenol, with early stage of outer layer (O) formation, thick middle layer (M), and a single, thin inner layer (I). $\times 1,000$. 3. Crushed mature spore in cotton blue-lactophenol with outer layer missing, thick middle layer (M) degraded to separable, amorphous flakes, and 2 thin, separable inner layers (I), the innermost composed in turn of 2 nonseparable layers. $\times 400$.

OTHER COLLECTIONS: OREGON--Douglas, Jackson, and Lane Counties--used in experiments and thus not available for herbarium deposit.

The complex layering of spore walls of *G. gerdemannii* strikingly separate it from all other known *Glomus* spp. The outermost, thin layer is apparent only in relatively young, smooth spores, because it flakes off soon after spores have reached full size and the 2nd layer inward has begun to thicken. At this stage, the inner 3 layers are not distinctly differentiated. As the outer 2 layers begin to flake away, however, the inner 3 differentiate clearly. The inner 3 layers persist, so that well-matured spores appear to have 3 thin wall layers enclosed in the rough, amorphous remnants of the degenerating outer walls.

The complex wall structure of *G. gerdemannii* resembles azygosporic species in *Acaulospora* and *Gigaspora* more than other species of *Glomus* (Gerdemann and Trappe 1974). Its hyphal attachment, however, places it in *Glomus* as an apparent chlamydospore. Sexual fusion could, of course, take place some distance below the attachment to the spore, but we have not observed it. In any event, *G. gerdemannii* is morphologically suggestive of a relationship between "chlamydosporic" Endogonaceae and azygosporic species.

Spores of *G. gerdemannii* sink rapidly in water. In retrieving them from soil by wet-sieving and decanting, the soil suspension must be decanted within less than a minute after stirring or most of the spores will have settled to the bottom.

Spores colonized by other fungi have been observed fairly often. One relatively frequent colonizer grows as brown, septate hyphae appressed to the degenerated surface of maturing spores (the outer walls of the spores degenerate whether or not microfungi colonize the surface). The brown, septate hyphae produce globose to irregular structures 10-25 μm diam. These structures, of undetermined function, remain attached to the *Glomus* spore walls. Hyaline globose cells 35-45 μm diam are attached to the surface of occasional spores of *G. gerdemannii*. These resemble the sporangia of *Rhizidiomyces stomatosa* Sparrow, reported by Schenck and Nicolson (1977) to parasitize Endogonaceae.

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PERICONIELLA VERRUCOSA SP. NOV. (DEMATIACEOUS HYPHOMYCETES) FROM DOUGLAS FIR WOOD

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The genus *Periconiella* Sacc. is characterized by macronematous conidiophores composed of a stipe and a more or less complex head of conidiogenous cells. The conidiogenous cells are integrated, polyblastic, sympodial, and cicatrized. Conidia are mostly solitary, occasionally in short chains, non-septate, or with transverse septa only. Ellis (1) has assigned twenty-three species to the genus, collected on a variety of plants from Australasia, Africa, Central America, India, and Puerto Rico. In Western Oregon a dematiaceous hyphomycete was frequently isolated from Douglas Fir wood samples from waterfront structures and utility poles. The isolate was morphologically distinct from previously recorded species and is described herein as a new species of *Periconiella*.

Colors were determined by use of Ridgway color standards (5), but names are cited by the Inter-Society Color Council Synonyms (ISCC-NBS) (3). Anatomical features were described from sections mounted in water. Photographs were taken using sections mounted in aqueous solutions of sodium carboxy methyl cellulose (NaCMC) as per Phinney and

Hardison (4). Collections have been deposited in the Plant Pathology Mycological Herbarium, University of Minnesota (MPPD), Commonwealth Mycological Institute (IMI), and the Mycological Herbarium of Oregon State University (OSC). Herbarium designations are those of Holmgren and Keuken (2). The minimum, maximum, mean, and standard deviation based on 50 observations for selected structures are presented in that order throughout the species description. Cultures were grown in the dark and light on 2% malt agar (pH 5.6), in a temperature controlled incubator at 20 C.

Periconiella verrucosa Stewart & Corden, sp. nov. Figs. 1-4

Coloniae radiantes, diam 10 dies natae 15-20 mm in agaro hordeano; coloniae juniores pallide griseo-olivaceae; vetustiores pallide luteo-brunneae; pilis brevibus oculo visibilibus, reversae atroluteo-brunneae. Mycelium superficiale, ex hyphis ramosis, septatis, levibus, brunneis 1.5-7 μm diam, et ex hyphis hyalinis 1-3 μm diam. Conidiophora macronematica ab extremis apicibus hypharum et citra orientia, constituta in stipite mononematica dividente supra apicem aut, rarius cita. Rami 3(1-6) solitarii vel brevibus catenis, 0-septati, cylindrici, hyalini vel pallide brunnei, 9-34 (15 ± 7.7) μm leves vel minute verruculosi, cicatricibus ornatī. Stipites erecti, recti vel flexuosi, cylindrici, septati, modica brunnei, apice pallidiore; parietes 0.7-1.5 μm latitudine, juniores leves vel minute verruculosi, prominenter vestustiores, 150-300 μm in longitudinem, 3-5 μm in latitudinem. Conidia acropleurogenosa; solitaria vel brevibus fulsis catenis, 0-septata, hyaline, vel valde luteo-brunneae, bina visa amplitudine; prima subglobosa, rara truncata, vel si modo minute, 3-4 (4 ± 0.4) x 2-3.5 (2.5 ± 0.3) μm ; secundo truncata plerumque, ellipsoidea, 5-9 (6.3 ± 0.7) x 3-4.5 (3.7 ± 0.5) μm .

Holotypus ES-2520, in MPPD, OSC, et IMI.

Colonies on malt agar 15-20 mm diam after 10 days; advancing hyphae appressed, hyaline, margins regular. Aerial colony a mass of conidiophores, light grayish olive when first visible, becoming light yellowish brown at maturity. Reverse dark yellowish brown. *Mycelium* superficial, of branched, septate, smooth walled brown hyphae 1.5-7 μm , and hyaline hyphae 1-3 μm diam. *Conidiophores* macronematous, arising terminally and laterally on the hyphae, composed of a mononematous stipe with a single or up to three branches at the apex; occasionally branched below the apex. *Branches* 3 (1-6), mostly a single

conidiogenous cell, occasionally in acropetal chains of two or more, 0-septate, cylindrical, hyaline to pale brown, $9-34 (15 \pm 7.7) \mu\text{m}$, smooth to minutely verruculose, with conidial scars. *Stipes* erect straight or flexuous, cylindrical, septate, moderate brown, paler towards the apex, walls $0.7-1.5 \mu\text{m}$ thick, smooth to minutely verrucose when first formed, prominently verrucose at maturity, $150-300 \mu\text{m}$ long, $3-5 \mu\text{m}$ wide, some tapering slightly near the apex. *Conidia* acropleurogenous, solitary, or in short acropetal false chains, 0-septate, smooth, hyaline or strong yellowish brown, of two apparent size classes; subglobose conidia, rarely truncate, and if so, only minutely, $3-5 (4 \pm 0.4) \times 2-3.5 (2.5 \pm 0.3) \mu\text{m}$, conidia mostly truncate, $5-9 (6.3 \pm 0.7) \times 3-4.5 (3.7 \pm 0.5) \mu\text{m}$.

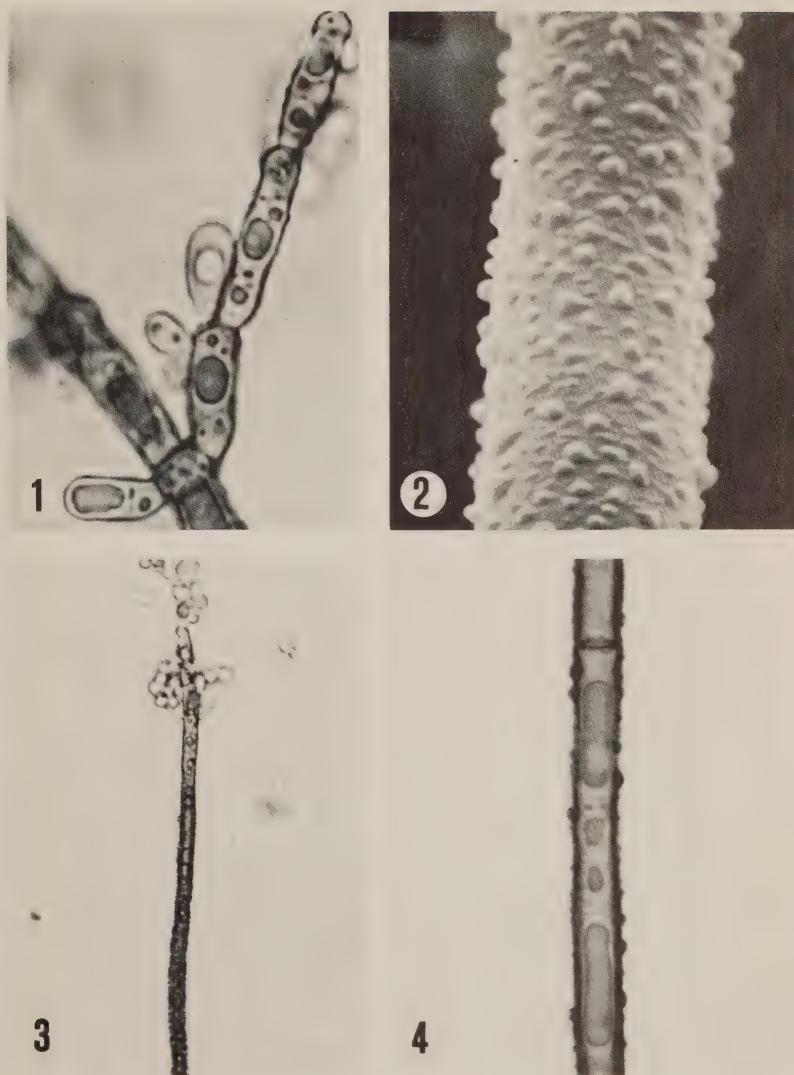
ETYMOLOGY: Latin, "Warty."

COLLECTIONS EXAMINED: Holotype: USA, Oregon 1975. Habitat, marine waterfront pilings and utility poles of Douglas Fir. ES #2520 (MPPD, OSC, IMI). Paratype: USA, Oregon 1975. Habitat, marine waterfront pilings and utility poles of Douglas Fir. ES #2522 (MPPD, OSC, IMI).

Of the species presently assigned to *Periconiella*, *P. verrucosa* appears most like *Periconiella smilacis* M. B. Ellis in the branching pattern of the conidiogenous cells and in having septate, thick walled mononematous stipes. *Periconiella verrucosa* is distinguished from *P. smilacis* by smaller, smooth walled conidia, and by the distinctly ornamented stipe.

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FIGS. 1-4: *Periconiella verrucosa*. 1. Conidiogenous cells illustrating a chain (false chain) of conidiogenous cells. x1420. 2. Scanning electron micrograph of the stipe illustrating the wart like protuberances unique to the species. x 5000. 3 and 4. Conidiophore from culture on malt agar illustrating apical and subapical branching, acropetal chains (false chains) of conidia; and septate, thick walled stipe. x 1420.

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LECTOTYPIFICATION OF *PHYSCONIA*, A GENERIC NAME BASED ON A MISNAMED TYPE SPECIES - A NEW SOLUTION TO AN OLD PROBLEM

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SUMMARY

The name *Physconia* was based on a type species cited by a nomenclaturally superfluous name, *Ph. pulverulenta*. An analysis of the type concept for generic names in the International Code of Botanical Nomenclature shows that *Physconia* can be lectotypified. A new species, *Physconia pulverulacea* Moberg is described and is appointed lectotype for *Physconia*.

The generic name *Physconia* was introduced by Poelt (1965) for a segregate of *Physcia*. The type species was cited as *Physcia pulverulenta* (Schreber) Hampe $\equiv$ *Lichen pulverulentus* Schreber. However, this is an illegitimate name, being nomenclaturally superfluous. Moreover, from its automatically fixed type it applies to a species quite different from that which Poelt had in mind; the former species does not even belong to the genus *Physconia* as intended by Poelt. Thus the typification of *Physconia* is an example of the problem that has become known as "citation of a type species by a misapplied name". The case includes some aspects that do not appear to have been discussed in this connection before. Therefore this paper will, we hope, contribute to the understanding of the problems involved in typification of generic names, though its main purpose is to clarify the nomenclature of *Physconia*.

The binomial *Physconia pulverulenta* (*Physcia pulverulenta*) is in common use for a wide-spread and well-known lichen. There is no taxonomic controversy regarding the identity and circumscription of the species to which this name is being applied, although wrongly. Apparently it was in accordance with this well-established usage that Poelt

cited *Physcia pulverulenta* as type species of his new generic name.

Before we proceed to the question of typifying the generic name *Physconia*, we will discuss the status of the name *Physcia pulverulenta*. *Lichen pulverulentus* was described as a new species by Schreber (1771 pp. 128 - 129). Schreber cited as synonyms three polynomials and one binomial, viz. *Lichen orbicularis* Necker. This is a validly published and legitimate name. Therefore *Lichen pulverulentus* Schreber is an illegitimate, nomenclaturally superfluous name (Art. 63). Since Schreber did not indicate a definite type, *Lichen pulverulentus* is automatically typified by the type of *Lichen orbicularis*, the name that should have been adopted under the rules (Art. 7.11). This fixes *Lichen pulverulentus* Schreber as a nomenclatural (obligate) synonym of *Lichen orbicularis* Necker. Necker (1768) based his *Lichen orbicularis* on a Dillenian polynomial, *Lichen* n. 71 (Dillenius 1741 p. 176), identical with t. 24, f. 71 (Dillenius, 1763), and the same Dillenian polynomial was included in Schreber's synonymy of his *Lichen pulverulentus* (and also by Hoffmann in describing *Squamaria pulverulenta*, see below). Thus *Physcia pulverulenta* and *Ph. orbicularis* have a common origin in Dillenius's polynomial, and this may be the reason why Schreber cited *Lichen orbicularis* as a synonym of *L. pulverulentus*.

Since *Lichen pulverulentus* Schreber is a nomenclaturally superfluous name, no binomials intended as new combinations based on this name as basionym are legitimate as new combinations. The Code does not admit a new combination to be based on a superfluous name. Generally, with the exceptions mentioned below, such a "combination" will form another superfluous name. In the case under consideration the citation of *Lichen pulverulentus* Schreber as basionym implies the inclusion of its type, identical with the type of *Lichen orbicularis* Necker, which furnishes the epithet that should have been adopted in each instance. The case is identical with that treated in Art. 63.1, example 4 (*Picea excelsa*). Under certain circumstances, however, such an intended new combination may turn out to be a legitimate name, but, if so, it is not a new combination. As far as we can make out there are three such cases: (1) If the superfluous "basionym" is holotypified by a type different from that of the name it is superfluous for (cf. Art. 7.11; see also Weresub & Hennebert, 1963), we believe, though it is not definitely stated in the Code, that the intended new combination will become a legitimate new name under Art. 72 Note 1.

This is not pertinent to *Lichen pulverulentus* and will not be further considered here. (2) If the author who intended the new combination excluded the type of the "basionym" at the same time, the intended new combination will become a new name for a new taxon to be typified on its own merits. It has no nomenclatural bond with the illegitimate name cited as basionym or with the name it is superfluous for. Exclusion of the type can be effected either explicitly or by implication (Art. 63.2). As pointed out by Nicolson (1977) the Code's examples of "exclusion of type by implication" are really examples of "exclusion of type through explicit inclusion elsewhere". (3) A name published as a new combination into a genus where the epithet of the name, for which the intended "basionym" is superfluous, would give rise to a homonym will, under Art. 72 Note 1, be treated as a new name. This is probably a rare case, but an example has been presented recently by Nicolson (1978): *Desmodium incanum* DC. 1825 was intended as a new combination based on *Hedysarum incanum* Swartz 1788, an illegitimate renaming of *H. racemosum* Aublet 1775, for which it is to be treated as nomen novum, because of the existence of the simultaneously published *Desmodium racemosum* DC. 1825 = *Hedysarum racemosum* Thunb. 1784 non Aublet 1775. This case is of no further importance to our subject: In none of the genera to which *Lichen pulverulentus* Schreber has been transferred does there exist an "*orbicularis*" based on another type than *Lichen orbicularis* Necker.

From these considerations it is seen that a new combination based on *Lichen pulverulentus* results in a legitimate name only under the provision that the author of the "combination" clearly indicated that he excluded the type of *Lichen orbicularis*, in practice effected by treating it as a different species.

Hoffmann (1790 p. 39) introduced the binomial *Squamaria pulverulenta*, basing it on *Lichen pulverulentus* Schreber. He did not exclude *Lichen orbicularis*, and *Squamaria pulverulenta* is therefore illegitimate. *Parmelia pulverulenta* (Schreber) Acharius (1803 p. 210) is likewise a superfluous name. Acharius did not exclude the type of *Lichen orbicularis*, on the contrary he cited it as a synonym. The binomial *Physcia pulverulenta* was introduced by Fűrnrrohr (1839, p. 249) who cited *Parmelia pulverulenta* Acharius as a synonym. He made no mention of *Lichen orbicularis* and therefore *Physcia pulverulenta* Fűrnrrohr is a superfluous name. This and other binomials introduced by Fűrnrrohr in this work have erroneously been ascribed to Hampe. For further details

see Moberg (1977, p. 60) -- Finally, Poelt (1965) made the combination *Physconia pulverulenta* (Schreber) Poelt, still another superfluous name.

Moberg (1977, p. 93) claimed that the epithet in the combination *Squamaria pulverulenta* Hoffmann should be treated as new following Art. 72, Note (Seattle Code), and changed the author citation for Poelt's combination to *Physconia pulverulenta* (Hoffm.) Poelt. This procedure is, however, untenable. As shown above *Squamaria pulverulenta* Hoffm. is nothing but a superfluous name. Article 72 is not concerned, and there is hence no basis for correction of a "bibliographic error of citation" (Art. 33, Note 2 and its example in the Seattle Code; this example was omitted in the Leningrad Code). In fact Moberg has introduced a new name to science, which should be cited as *Physconia pulverulenta* Moberg. This is a validly published name for a new species since Moberg included a reference to a previously effectively published diagnosis (Hoffmann's) and indicated a type (as 'neotype'). It is not nomenclaturally superfluous although Moberg cited *Lichen pulverulentus* Schreb. as a synonym. In the same publication Moberg treated *Lichen orbicularis* Necker as a distinct taxon (p. 44, as basionym of *Phaeophyscia orbicularis*) thus excluding the type of *Lichen pulverulentus* Schreber from his circumscription of *Physconia pulverulenta* Moberg. But it is illegitimate, being a homonym of *Physconia pulverulenta* (Schreber) Poelt.

In summary: The names *Physcia pulverulenta* (Schreber) Fürnrohr and *Physconia pulverulenta* (Schreber) Poelt are illegitimate, superfluous names. By their type they do not apply to the species that is commonly known under these names. *Physconia pulverulenta* Moberg applies to this species but is illegitimate being a later homonym. Since this species obviously lacks a legitimate name we will here furnish one:

PHYSCONIA PULVERULACEA Moberg n. sp.

Thallus foliaceus, orbiculatus, laxe adnatus, cinereo-brunneolus vel atro-brunneus, vulgo pruinosis, sorediis isidiisque destitutus. Lacinae radiatae, vulgo imbricatae, subtus nigrae prope apicem brunneae. Rhizinae abundae, nigrae, squarrosae. Cortex superior scleroplechtenchymatus, cortex inferior prosoplechtenchymatus. Apothecia abunda, usque ad 5 mm diametro, vulgo margine lobata. Sporae (25-) 27-38x13-20 μ m.

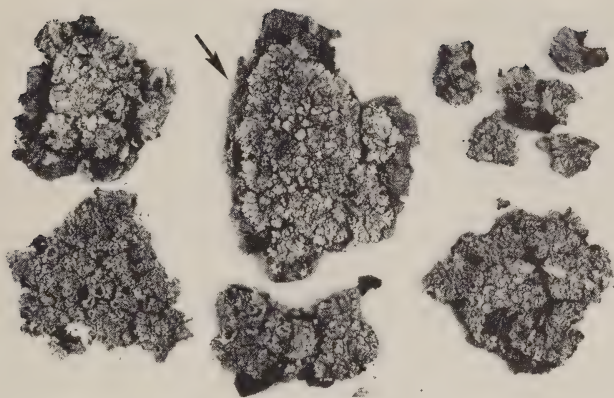


Fig. 1. *Physconia pulverulacea* Moberg, holotype (arrow).

Pycnidia vulgo immersa, pycnoconidia 5-(?) $\times$ I-I.5 μ m.

Holotypus: Germania, Lipsia in Tilia, 1767 Schreber (M).
(Fig. I).

Evidently, the species that Poelt had in mind was *Physconia pulverulacea* although he cited *Ph. pulverulenta*. What is then the type species of *Physconia*? The question of how to typify a generic name, where the type species has been misidentified has been much disputed. It has become known as "citation of a type species by a misapplied name", but this is not quite adequate. A misapplied name is a name that is applied to a taxon so circumscribed that it excludes the type of that name. There is no controversy regarding this case (cf. Weresub 1967 p. 33 last paragraph). The problems arise when an author of a generic name does *not* exclude the type of the species name he cites, but when it is evident from taxonomic judgements that he has misidentified his specimens. Two divergent opinions have been advanced. Donk (1952) and Nannfeldt & Eriksson (1952) defended the view that the type species of a generic name should be a species that the author of the generic name virtually had in mind when describing the genus, irrespective of the name he attributed to it, or as formulated by Nannfeldt & Eriksson: "The type of a generic name must be a species so circumscribed as to include at least one of the specimens studied

by the author when describing the genus." Weresub (1967), on the contrary, vindicated the idea that the species cited by name (that is the species including the type specimen of that name) by an author of a generic name be accepted as holotype, and made a formal proposal for an addition of a paragraph to this effect to Art. 10. In other words, the type specimen of the name of the type species would indirectly serve as type for the generic name. Each of these interpretations has its advantages and drawbacks.

The advantage of Donk's and Nannfeldt & Eriksson's view ("the idealistic approach") is primarily that it is in accordance with common sense. The example given by Nannfeldt & Eriksson is very illustrative: Karsten validly published the name *Lachnellula* with the following short diagnosis: "Est *Lachnella* sporis sphaeroideis" for one single species cited as *Lachnellula chrysophthalma* (Pers.) Karst. To base *Lachnellula* on a quite different species which does not exhibit the character of having spherical spores would appear rather absurd. Nevertheless, in a number of cases there arise considerable difficulties if one tries to apply this approach. It may be impossible to determine exactly which specimen or specimens the author actually had at hand when describing the genus, or the genus may have been erected on purely bibliographic grounds. The most important objection is, however, the ambiguity in the identity of the type (this will be further detailed below). Weresub's proposal ("the pragmatic approach") aims to warrant an unequivocal type — but at the expense of the common sense aspect: Some generic names will apply to taxa quite different from those intended by the author of the generic name.

The question of how to typify generic names based on misidentified type species has been the object of an IMA Nomenclature subcommittee (now dissolved) and is at present being studied by an IAPT committee. We cannot foresee what will be the eventual result of these considerations. The only thing we can do is to try to find a path to solve our problem guided by the Code as it stands at present (Lenin-grad Code).

In our opinion some of the crucial typification problems — including the typification of *Physconia* — may be solved by lectotypification. The present Code permits lectotypification to a certain but limited extent in cases like this. Holotypification contra lectotypification has been a central point in the discussion on generic typification (Weresub, 1967; Stafleu & Voss 1972, pp. 98 - 100). It is therefore essential to understand in what instances a holo-

type is extant and when the Code allows for lectotypification. It is often assumed that Art. 37 implies that all names published on or after 1 Jan. 1958 are automatically holotypified. This is, however, a too extensive interpretation of Art. 37. Art. 9.2 stipulates that if a type specimen is found to contain parts belonging to more than one taxon, a lectotype may be selected. And if a name is lectotypifiable there can be no holotype. This applies to post-1958 as well as to pre-1958 names. In fact, a type is not necessarily a holotype even if it was designated as such by the type author. Under the condition of the taxonomic conclusion that a type consists of "discordant elements" the taxonomic process of lectotypification may be undertaken. The signification of Art. 37 is to guarantee that the element is supplied from which the type is to be selected in accordance with Arts. 7 — 10. It sets up a condition that must be fulfilled for a name to be validly published. As far as typification is concerned it adds nothing to Arts. 7 — 10. Now, one may demur, this concerns only those names whose types are specimens, not generic names. Right. But nevertheless it proves that a type indicated along with Art. 37 is not always holotype, which is the essential point.

The Code requires (Art. 37) that an author who publishes a name on or after 1 Jan. 1958 should indicate the nomenclatural type. But, in the case the type is a taxon, what does the Code mean by "indicating a type"? The natural way is of course to cite its name. The first thing we will have to consider is this: what does it mean, from a strictly nomenclatural point of view, when an author who is studying a certain species accredits a certain name to this species. The Code states (Principle II) that the application of names of taxonomic groups is determined by means of nomenclatural types. Therefore we can formulate the following statement: When an author identifies one or more specimens, he is actually saying: "I regard this specimen (these specimens) to belong to a species so circumscribed as to include also the type of the name I am mentioning". A wrong determination is therefore in fact a circumscription that is wrong in someone's opinion, a purely taxonomic matter. Therefore, when an author makes a direct or indirect reference to an earlier published name, the type of that name is included irrespective of the circumscription of the taxon to which this name is being applied. But on the other hand, if an author clearly indicates that he excludes the type of a name he is using, he has in fact created a homonym with a different type (Art. 48). An analysis of these matters has

recently been presented by Nicolson (1977).

The Code stipulates that "the type of a name of a genus ... is a species". (Art. 10). However, it does not demand that this species has a validly published name. Therefore other ways to indicate a type species than by citing its name will have to be accepted. A species in the sense of the Code is a taxon, a constituent quality of which is to have a circumscription. And a type species is a taxon in the rank of species as circumscribed by the author who makes the typification — be it the author of the generic name or one who makes a later lectotypification. Therefore all specimens possibly mentioned should be taken into consideration as an indication of the species in the sense of that author. Thus, as "indication of type species" are accepted: (1) the type specimens of the specific names cited by the author (not only the type of the name he accepts for it but also the type of any taxonomic synonyms he cites) and (2) any specimens he cites as actually studied by him. If the specimens under (1) and (2) are later considered to belong to more than one species, these species are to be regarded as "syntypes", and a lectotype will have to be chosen among them. As lectotype should be chosen the species which corresponds most nearly with the original description. Therefore, generally, a species including a specimen studied by the author has precedence over a species cited only by name, which may have been cited only incidentally (misdetermination). In those cases where no studied specimens were indicated, only the name or names cited can be used to determine the type species.

Obviously, lectotypification along these lines will lead to the same result as that recommended by Nannfeldt & Eriksson (1952) and Donk (1952), though with a different argumentation. However, the applicability of the lectotypification process outlined above is much more restricted than that of these authors, since the only species eligible as lectotypes are those represented by specimens actually cited by the author of the generic name. The basis for our argumentation is the present Code's ruling that a type of a generic name is a taxon (species). But how can such an ambiguous thing as a taxon be a type? A species may be interpreted widely differently by different taxonomists. What is one species to one person may be ten species to another. A holotype (species) may be divided into several "syntypes" because of a taxonomic judgement. Can there ever be a stable type for a generic name? This ambiguity is built-in within the present Code.

The only way to get rid of this ambiguity will be to tie the identity of a type species to a specimen. And this is exactly what Weresub's proposal does. Nevertheless, although we agree with Weresub's line of argument to a certain point, we cannot totally support her proposal. In Weresub's opinion her proposal deals with *holotypified* generic names. It should be emphasized that the signification of the term "holotype", as contrasted to lectotype or neotype, is that it is a type recognized on purely nomenclatural grounds without any taxonomical considerations. Now, many generic names, probably most of them, are based on old species, whose names do not always have holotypes. Following Weresub's arguments the type of a generic name is a species which includes the type specimen of the cited type species. But if this type specimen is in its turn a lectotype or a neotype, the type of the generic name will undeniably be (indirectly) dependent on taxonomic considerations. It can hardly be maintained that such a type is a holotype. Moreover, Article 8 provides for alteration of a lecto- or neotype on taxonomic grounds. Therefore a generic type will be liable to changes because of changes in the typification of its name. If a genus is based on a species whose name is lectotypifiable, we see no reason why the generic name should not be lectotypifiable too, and if so, why should it not be possible to typify the generic name independently of the name of its type species? We are, after all, dealing with typifications on two different levels that should not be confused with each other.

Although we do not wholly support Weresub's idea, we feel the need to include in the Code a regulation which ties the type of a generic name to a certain specimen. This goal can be gained in two ways, either by deciding simply that the type of a generic name is a specimen or by deciding that the type of a generic name is a species that includes a certain specimen. The difference between these two approaches is in fact semantic rather than real. The term generic type specimen was introduced by Donk (1959, p. 84). We find it very useful, and besides selecting a lectotype species we will also designate a generic type specimen, which serves the purpose of leaving the identity of the selected lectotype species beyond any doubt. It may be noticed that in this case the generic type specimen is identical with the holotype of the name of the lectotype species.

After this digression on typification of generic names let us now return to the topic that was the original scope of this paper. In the protologue of *Physoconia*, Poelt indi-

cated the type species as follows: "Typus generis: *Lichen pulverulentus* Schreber, *Physcia pulverulenta* (Schreber) Hampe (M)." As we have shown above *Lichen pulverulentus* Schreb. is a superfluous name for *Lichen orbicularis* Neck. This species was not treated in Poelt's paper and therefore Poelt included its type by citing its obligate synonym, the superfluous name. However, the citation "(M)" refers to Schreber's specimen of *Lichen pulverulentus* in herb. M. With our discussion above in mind we see that *Ph. pulverulenta* as circumscribed by Poelt includes two specimens, viz. (1) the type specimen of *Lichen orbicularis* Necker (= the type specimen of *L. pulverulentus* Schreb.) and (2) Schreber's specimen in M. Obviously Poelt cited the type species as he did because he did not realize that Schreber's name is illegitimate and the specimen in M would have been the natural (lecto)type for it if it had not been superfluous. There is no controversy regarding the taxonomic status of *Phaeophyscia orbicularis* (Neck.) Moberg and *Physcia pulverulenta* sensu auctt. non (Schreber) Hampe, now *Physconia pulverulacea* Moberg, as two distinct species and it is generally agreed (certainly also by Poelt) that they should be classified in two different genera. But we cannot get around the link between a name and its type, and therefore, *Physcia orbicularis* (Neck.) Poetsch is a correct name for the type species as circumscribed by Poelt. But since to our taxonomic judgement the two specimens included in this circumscription represent two distinct species (two discordant elements), these species are equivalents of syntypes. As lectotype should be chosen the species which best matches Poelt's description. Therefore we hereby select *Physconia pulverulacea* Mob. as lectotype for *Physconia* Poelt (generic type specimen: Germania, Lipsia in Tilia, 1767 Schreber, M).

Footnote: We have been using the word syntype for generic names within quotation marks since, strangely enough, the Code does not sanction the use of this term for the species among which a lectotype for a generic name is to be chosen. (Art. 7: "A syntype is any one of two or more *specimens* cited by the author...", but "A lectotype is a specimen or other element selected..."). We see no reason why this very useful term should not be applicable to types that are taxa as well as to types that are specimens.

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MYCOTAXON

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January-March 1979

REVUE DES LIVRES

par

G.L. HENNEBERT

*Book Review Editor, Croix du Sud 3, B-1348 Louvain-la-Neuve,
Belgium*

MULTILINGUAL COMPENDIUM OF PLANT DISEASES: VIRUSES AND NEMATODES,
par Paul R. MILLER et Hazel L. POLLARD, 434 p., 229 ph. col.,
quarto, 1977, cartonné-toilé. Ed. The American Phytopathological
Society, 3340 Pilot Knob Road, St Paul, Minnesota 55121, USA.

297 maladies causées aux plantes cultivées par les virus et les
nématodes sont cataloguées par les auteurs. Leur dénomination est donnée
en 18 langues: anglais, français, espagnol, portugais, italien, russe,
suedois, allemand, néerlandais, hongrois, bulgare, turc, arabe, thai,
hindi, indonésien, coréen, chinois et japonais. Une description d'une
dizaine de lignes, répétée en 4 langues, anglais, espagnol, français et
"interlingua", accompagne la fiche d'identité. Une série de 229 photogra-
phies en couleurs de format 5x5 cm, groupées en 26 planches, illustre
un bon nombre des maladies cataloguées. Après les index latins des agents
et des hôtes, viennent les index généraux dans les 18 langues. Cet
ouvrage contribuera sans doute à faciliter la communication entre spécia-
listes, dans les publications et les réunions scientifiques et coordonner
les législations de portée internationale en la matière.

COMPENDIUM OF WHEAT DISEASES, par M. V. WIESE, 106 p., 103 figs.,
63 phot. col., quarto, dos papier, 1977. Ed. The American Phyto-
pathological Society, 3340 Pilot Knob Road, St Paul, Minnesota
55121, USA.

L'ouvrage débute par une clé dichotomique symptomatologique permet-
tant l'identification macroscopique des maladies du froment. Les maladies
sont ensuite systématiquement décrites et illustrées. Les unes sont
infectieuses, bactériennes, mycoplasmaïques, fongiques (sur semences, sur
feuillage, sur racines et sur tiges), nématiques ou virales. Les autres
sont non-infectieuses, dues à l'intervention d'animaux ou de facteurs du
milieu. Un glossaire achève l'ouvrage. L'intérêt de ce travail est double:
d'abord, il couvre un grand nombre des maladies du blé; des 200 maladies
connues, 50 sont communes et d'importance économique, réduisant les ré-
coltes annuelles de 20 %; d'autre part, il excelle par la qualité de sa
documentation et le choix d'une illustration démonstrative et "uptodate".

IMPROVING THE DISSEMINATION OF SCIENTIFIC AND TECHNICAL INFORMATION
A PRACTITIONER'S GUIDE TO INNOVATION, préparé par le CAPITAL SYSTEMS
GROUP INC. for the Office of Science Information Service, N.S.F.,
Distribué par le National Technical Information Service, 5285 Port
Royal Road, Springfield, VA 22161, USA.

Un complément "Standard Format for calendar dates" et "Computer-managed
conferences" a été édité en 1977.

LA SANTE PAR LES CHAMPIGNONS, par Georges A. LAFUENTE. 139 p., illustré au trait, 18x12 cm, 1974. Editions du Jour, 10 rue Mayet, 75006, Paris. Prix 10 FF.

Un titre quelque peu trompeur, puisque ce n'est ni un traité de médecine ni un guide de diététique. C'est simplement l'introduction à la connaissance des champignons toxiques et comestibles, bien nécessaire si l'on veut éviter l'empoisonnement. Il faut pratiquer la mycologie avant la mycogastronomie dit l'auteur.

MYCOLOGIE DU GOUT, par Marcel V. LOCQUIN, 97 p., 1 tabl., broché, dos papier, 25x16 cm, 1977. Ed. J.F. Guyot, 8 rue de Mézières, 75006 Paris.

Comme la gastronomie, la mycogastronomie est un art. Il ne s'improvise pas, il s'apprend. Mais à la base, ce conseil de l'auteur: ne consommer que des champignons d'identité certifiée. L'auteur a goûté 700 espèces, il en retient 300 comme comestibles intéressantes, mais n'en propose qu'une centaine à la consommation courante. Un tableau synoptique en donne la valeur pour chacun des usages types, soit à l'état cru en salade, soit à l'état cuit en légume, condiment, sauce, potage, garniture, avec oeufs, viandes, poissons, crustacés, ou encore en dessert, fromage, boisson. 176 recettes sont décrites, de mêmes que 12 méthodes de conservation.

LES CHAMPIGNONS COMESTIBLES, par Olle PERSSON et H.K. PRINT, traduit par Anne Besançon. Coll. "Nouveaux Guides du Naturaliste", 134 p., illustré en coul. et b.n., 12x18 cm, dos semi-rigide, 1975. Ed. Fernand Nathan, 18 rue Monsieur le Prince, 75006 Paris.

Ce petit guide est fort intéressant par le fait qu'il présente les champignons les plus communs par milieu écologique différent: la forêt d'épicéa, la forêt de pin, la forêt de chênes et hêtres, la lisière forestière et la prairie, les parcs et les jardins. 80 espèces constituant les associations écologiques sont décrites et illustrées d'une manière didactique adaptée au non-initié. Des commentaires propres à chaque espèce sont groupés en fin du livre. Une présentation originale.

RECONNAÎTRE LES CHAMPIGNONS, par Hans Burckhardt, Coll. "Multiguide nature", 128 p., 102 phot. col., 12x19 cm, cartonné toilé, 1977. Ed. Elsevier Sequoia, Leuvensesteenweg 325, 1940 Woluwe, Belgium, Prix 295 FB. (Traduit de PILZE, par H. Burckhardt, Ed. Albrecht Philler Verlag, Minden, D., par Héry Fastré-Kok).

Ce guide pour débutant présente 102 espèces de basidiomycètes, toutes illustrées de bonnes photographies en couleurs, et d'une description brève. Le choix d'espèce correspond plus précisément à l'Europe centrale. De bons conseils destinés aux débutants sont donnés dans la seconde partie de l'ouvrage. L'édition est impeccable.

SCHWEIZER PILZTAFELN, PLANCHES SUISSES DE CHAMPIGNONS, anonyme, tome 1, 48 p., 40 pl. col., 1967 (5e éd.), tome 2, 86 p. 75 pl. col. 1965 (4e éd.), tome 3, 84 p., 80 pl. col., 1969 (3e éd.), tome 4, 68 p., 75 pl. col., 1968 (2e éd.), tome 5, 42 p., 80 pl. col., 1975 (1e éd.), dos papier, 11 x 16 cm. Ed. Union Suisse des Sociétés Mycologiques, Schnarnachtalstrasse 2, CH-3006 Berne.

Les cinq fascicules parus ont été publiés en français, en allemand et en italien. Le nombre total d'espèces actuellement décrites est de 350. Les illustrations sont des reproductions d'aquarelles et sont présentées en vis à vis des descriptions, à raison de deux espèces par double page. Il n'y a pas d'ordre particulier dans la présentation des espèces. L'index de chaque tome est cumulatif, incluant les tomes déjà parus. Les aquarelles de très bonne qualité par le dessin et la couleur sont plus didactiques qu'artistiques et répondent bien au but de l'ouvrage d'être un bon catalogue d'identification des champignons de la Suisse.

PILZE, DIE NICHT JEDER KENNT, par Hans HAAS et Heinz SCHREMPP, 70 pages, 112 phot. col. 13,5x19,5 cm, cartonné laminé, 1974, Coll. Bunte Kosmos Taschenführer. Ed. Kosmos, Gesellschaft der Naturfreunde Franckh'sche Verlagshandlung, W. Keller & Co, Stuttgart, Deutschland. Prix DM 8.80.

Dans la collection des Guides Kosmos, ce petit livre, dû à la plume du Dr Haas, mycologue et à la photographie de H. Schrempp, est une perle de qualité. 120 espèces d'ascomycètes et de basidiomycètes sont décrites et illustrées, à raison de 4 par double page.

PILZE MITTELEuropas, SPEISE- UND GIFTpilze, par Hans HAAS, 80 aquarelles de Gabriele GOSSNER, 304 p., 80 pl. col., 19 x 13 cm, cartonné toilé, 1976. Ed. Kosmos, Gesellschaft der Naturfreunde Franckh'sche Verlagshandlung, W. Keller & Co, Stuttgart, Deutschland. Prix DM 19.80.

Hans HAAS, l'auteur du livre précédent, met ici en valeur quarante aquarelles de l'artiste Gabriele GOSSNER, dans un livre à la fois luxueux et scientifique. Les Editions Kosmos n'ont d'ailleurs pas trahi la qualité du texte et des illustrations. Celles-ci sont présentées en face des descriptions dans la première partie; la seconde partie est consacrée aux clés de détermination et à la classification de 554 espèces brièvement décrites. L'ouvrage sera apprécié par les mycologues amateurs, spécialistes et bibliophiles.

HONGOS DE NUESTROS CAMPOS Y BOSQUES, par Francisco de Diego CALONGE, préfacé par Alvaro ZUGAZA, 1^{re} édition, 316 p., 120 figs. col., 1975, 2^e édition, 344 p., 133 figs. col., 1977, cartonné toilé. Ed. Instituto Nacional para la Conservacion de la Naturaleza, Servicio de Publicaciones Agrarias, Paseo de Infanta Isabel 1, Madrid 7, España.

Dans cette seconde édition de son ouvrage déjà bien connu, l'auteur présente 13 espèces de plus, soit un total de 125 espèces, appartenant aux ascomycètes, basidiomycètes, gasteromycètes et mixomycètes. Les espèces sont présentées par ordre alphabétique dans leur classe. Description et photographie en couleurs se font face. Les photographies sont de bonne qualité et l'édition luxueuse. Ce guide inclut des espèces propres à l'Europe méridionale et la Péninsule ibérique.

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No. 2

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CALONECTRIA AND ITS TYPE SPECIES, *C. DALDINIANA*, A LATER SYNONYM OF *C. PYROCHROA*

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SUMMARY

The monotype species of *Calonectria* de Notaris, *C. daldiniana*, is described and illustrated from the holotype specimen. This species is found to be a later synonym of *C. pyrochroa*. The genus *Calonectria* is circumscribed to include only those nec- trioid species with an ascocarp wall structure like that of *C. pyrochroa* and a *Cylindrocladium* anamorph. *Calonectria pyrochroa* and its *Cylindrocladium* anamorph, grown from Macar- onesian collections, are described and illustrated.

Within the Hypocreales the genus *Nectria* occupies a central position from which allied genera have been segregated, often based on only one character. Although the type of *Nectria*, *N. cinnabarina* Tode ex Fries, does occasionally have multiseptate ascospores, *Nectria* has traditionally included species with one-septate ascospores. Species with aseptate ascospores have been placed in *Pseudonectria* and those with multiseptate ascospores in *Calonectria* and *Ophionectria*. As a result these genera have become the repository of unrelated species.

In an attempt to define natural groups within the genera related to *Nectria*, type specimens of described taxa have been examined. Rossman (1977) has restricted the genus *Ophionectria* to the type species, *O. trichospora*, excluding all other previously described species. Despite the long, multiseptate ascospores, *O. trichospora* is closely related to *Nectria* in ascocarp morphology and cultural characteristics. The genus *Calonectria* was erected for a species which has multiseptate ascospores and is differentiated from *Ophionectria* by asco- spores with a length-width ratio of less than 10:1 (Rogerson, 1970). Recently Samuels (1978) has included species with multiseptate ascospores in the genus *Nectria*, thereby placing related species in "groups" within *Nectria sensu lato*.

Although over 200 species of *Calonectria* have been de- scribed, the monotype species, *C. daldiniana*, has not been examined, redescribed or illustrated since the original de- scription published in 1867. Because requests for this spec-

*Presently the Anna E. Jenkins Postdoctoral Fellow.

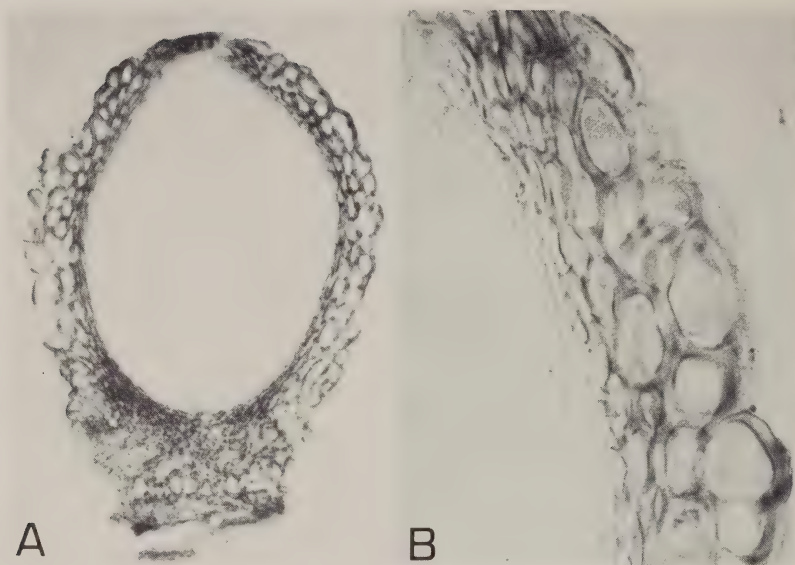


Fig. 1. *Calonectria daldiniana* Holotype (RO). A. X-section of ascocarp x 140. B. Detail of ascocarp wall x 560.

imen to numerous Italian herbaria had been negative, the type specimen of *C. daldiniana* was thought to be lost. After an examination of the type specimens of taxa described in *Calonectria*, it became imperative to determine whether or not the type of *C. daldiniana* was lost or destroyed, and if so, how the species should be neotypified.

Calonectria daldiniana was described in one of the last works of de Notaris (1867) published after he had come to Rome to become a Senator. In his paper the species is cited as part of "Sfer. ital. cent. II. mss.," a work that was never completed. During the summer of 1978, Dr. Gary Samuels, Division of Scientific and Industrial Research, Auckland, New Zealand, and I visited many herbaria in northern Italy searching for the missing type specimen which was finally located in Rome. Although the bulk of the specimens at RO* are those of Cesati, who worked closely with de Notaris, the rather scanty type specimen of *C. daldiniana* is housed in the smaller, general mycological herbarium. In my taxonomic judgement the type specimen of *C. daldiniana* is identical with type specimens of *Nectria pyrochroa*, an earlier epithet. Because later mycologists may not agree with this judgement and because the type and only specimen of *C. daldiniana* is in poor condition and not readily available, this specimen is described below and illustrated in figures 1 & 2.

*Abbreviations of herbaria are those of Holmgren & Keuken (1974)

Calonectria daldiniana de Notaris, 1867. [Figs. 1-2]

Holotype: ITALY, su foglie sternate di *Magnolia grandiflora* a Locarno, Daldini.

ASCOCARPS solitary, superficial, red-orange, "scarlet"* to light "bay," turning "red," rose-purple, in 2% KOH, reaction reversing when acidified, ovoid, 350-420 x 300-350 μ m; erumpent through leaf surface, darkened around the base leaving a spot on leaf 150-200 μ m diam; collapsed collabent, laterally or not at all; many ascocarps broken, fractured longitudinally or recessed through leaf epidermis, probably due to tight stacking when stored; ostiole present, apex sometimes darker, papillae slightly pointed to none, ascocarp wall appearing slightly scurfy.

ASCOCARP WALL composed of two intergrading regions: the inner 1-2 layers of hyaline, thin-walled cells, elongate parallel to the centrum; the outer layers of cells with thickened walls, elongate, becoming larger and more globose toward the outside, eventually forming *textura angularis*; outermost cells globose, 12-30 μ m diam, walls up to 2 μ m thick, sloughing off to form a granular scurf.

ASCI unitunicate, broadly clavate, 70-75 x 25-28 μ m, thin-walled to evanescent, apex undifferentiated. No evidence of paraphyses but amorphous strands present, remnants of apical paraphyses.

ASCOSPORES narrowly-fusiform with rounded ends, straight, curved or sigmoid, 46-61 x 5-6 μ m, 3-septate, hyaline to slightly yellow with age, generally loose in the ascocarp.

The specimen consists of three leaf fragments one of which has a rectangular portion removed suggesting that an isotype may exist. The leaves are partially skeletonized, obviously in an advanced state of decay. Of the approximately fifty ascocarps, many are overmature or disintegrating with only the bottom part of the ascocarp remaining. No evidence of a *Cylindrocladium* anamorph was found on this rather overmature specimen. Differences in the description of this specimen and that of the species *Calonectria pyrochroa* are greater variation in size and shape of ascocarps, asci and ascospores in *C. pyrochroa* and the only slight development of scurf on the ascocarps of the specimen of *C. daldiniana*.

CALONECTRIA de Notaris, Comment. Soc. Crittogam. Ital, 2:477. Feb. 1867.

Ascocarps superficial, red-orange to dark-umber, turning purplish in KOH, reaction reversing when acidified. Ascocarp wall composed of two intergrading regions: the inner layers of hyaline *textura porrecta* with cells elongate parallel to the centrum; the outer layers of *textura angularis* to *textura globulosa* toward the outside, cell walls thin to thickened, pigmented. Asci unitunicate, evanescent at maturity, apex undifferentiated. Ascospores elliptic to fusiform, one to multiseptate. Anamorph *Cylindrocladium*.

Holotype species: *Calonectria daldiniana* de Notaris, a later synonym of *Nectria pyrochroa* Desm.

*Colors in quotes are based on Rayner (1970).

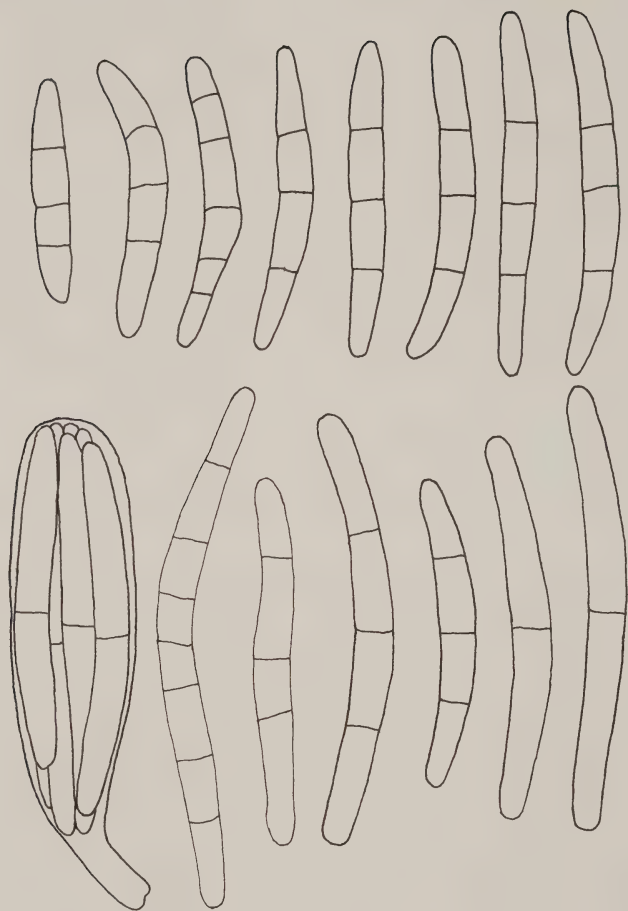


Fig. 2. *Calonectria dalдинiana* Holotype (R0). Ascospores x 1000. Fig. 3. *Calonectria pyrochroa* (CUP-MM 2407). Ascus and ascospores x 1000.

- Calonectria pyrochroa* (Desm.) Sacc., *Michelia*
 1:308. 1878. [Figs. 1-4]
 = *Nectria pyrochroa* Desm., Pl. Crypt. France Ed. 2 (2)
 #372. 1856.
 = *Calonectria daldiniana* de Not., Comment. Soc. Crittogam.
 Ital. 2:477. 1867.
 = *Ophionectria puiggarii* Speg., Bol. Acad. Nac. Ci.
 11:532. 1889.
 = *Nectria leguminum* Rehm, Hedwigia 39:221. 1900.

ASCOCARPS solitary, superficial, erumpent through and firmly adhering to leaf surface, globose to ovoid, 300-410 x 320-380 μm , collabent or collapsing laterally or not at all when dry, red-orange to dark-red, "scarlet" to "bay", turning "red", rose to purple in 2% KOH, reaction reversing when acidified, often with a white to yellow cast due to the scurfy outer wall; papillae indistinct to small, pointed, often darker; ostiole present; ascocarps erumpent through epidermis, leaving base immersed in substrate, the base and surrounding host tissue sometimes becoming darkened and leaving a dark-rimmed spot when the ascocarp disintegrates or becomes detached.

ASCOCARP WALL composed of two intergrading regions: the inner layers of hyaline, thin-walled cells elongate parallel to the centrum; the outer layers of *textura angularis* becoming *textura globulosa* toward the outside, outer cells globose, large, 20-35 μm diam, walls pigmented, slightly thickened, up to 1.5 μm , outermost cells only loosely adhering to the ascocarp and forming an irregularly-distributed scurf; rarely with long, straight, sparsely scattered, septate hairs developing from the small, outer cells 10-12 μm diam, hairs 127-179 x 7-8 μm at base, walls thickened up to 2 μm , pigmented, occasionally branched, tapering gradually to an acuminate apex.

ASCI unitunicate, broadly obovate to clavate, thin to evanescent at maturity, 64-90 x 17-25 μm , without any specialized apical apparatus, sometimes with a short stalk on young asci. Apical paraphyses present in young ascocarps but disappearing at maturity.

ASCOSPORES narrowly-fusiform with rounded ends, often curved or sigmoid, 40-70 x 4-7 μm , 1- to 3-septate, rarely 5- or 7-septate, hyaline, sometimes slightly constricted at each septum, smooth or becoming minutely roughened, contents granular, eight parallel spores per ascus.

ANAMORPH: *Cylindrocladium* sp.

SPORULATING BRANCHES erumpent through epidermis forming a black-rimmed spot, or occasionally at base of ascocarp; arising from substrate surface or, in culture, from pigmented hyphae at surface of colony; branching one to four times, monopodial or opposite, branches 5-6 μm diam, with a septum at the base of each branch.

CONIDIOGENOUS CELLS phialidic, without a collarette or flared opening, 8-20 x 2.5-3.5 μm .

CONIDIA cylindric with truncate-rounded ends, 1- to 3-septate, hyaline, 39-60 x 4-6 μm .

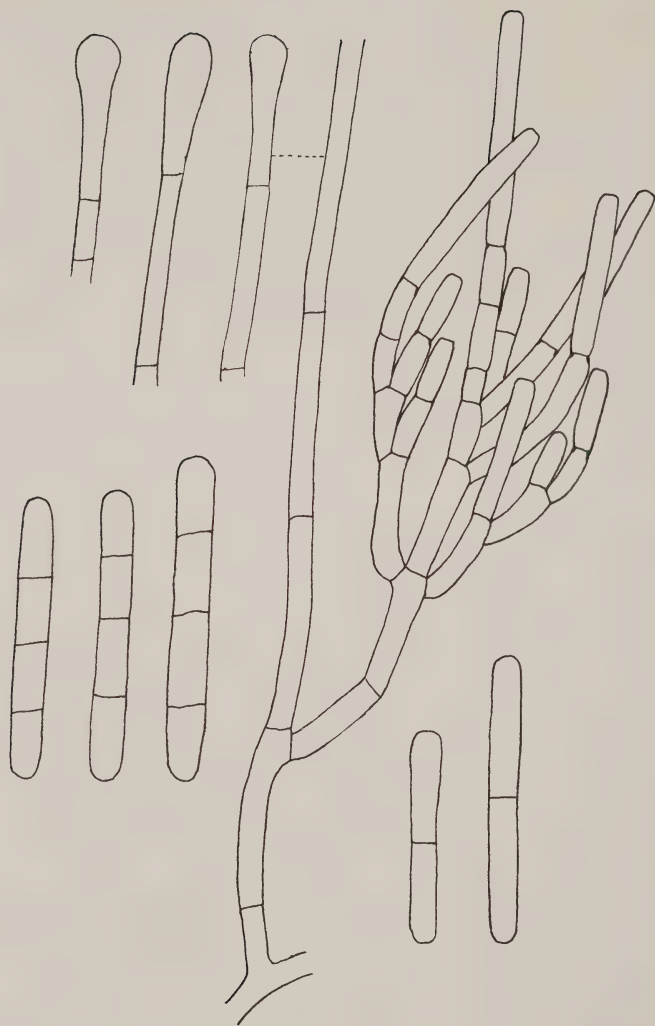


Fig. 4. *Cylandrocladium* anamorph of *Calonectria pyrochroa* (CUP-MM 2407). Conidiophorous branches, apical vesicles and conidia x 1000.

APICAL VESICLES borne on long, upright stalks branching below or at the level of the conidiophorous branches, extending beyond the tips of the conidia, stalk 150-190 μm long, vesicles ovate, clavate to subglobose, ultimate cells 25-65 x 5-6 μm at base, becoming 7-9 μm broad at apex.

CULTURAL CHARACTERISTICS: Ascospores germinate overnight on CMD* forming 1 to 3 germ tubes; colony diameter, after 3 days, on CMD, MA* and PDA* 0.8-0.9 cm; after 10 days, CMD 3.8 cm, PDA 3.3 cm, MA 2.1-2.3 cm; on CMD, aerial mycelium lacking or sparse, colony becoming "orange" to "sienna;" on MA, white, aerial mycelium, profuse sporulation, colony "sienna" to "umber;" on PDA, abundant, thick, white to "orange" hyphae, sporulation only at margin of colony, submerged mycelium "orange" to "umber." Conidia developing on all media tested after 3 days; vegetative hyphae frequently branched, contorted, 3-7 μm diam.

HABITAT: On rotting leaves, usually on the lower surface, rarely on decaying twigs and woody pods; often in wet areas such as dense forest understory, seepages and streams; known from *Acacia* sp., *Hedera helix*, *Magnolia grandiflora*, *Pittosporum undulatum*, *Platanus* sp. and unidentified Lauraceae.

DISTRIBUTION: Tropical and warm temperate regions; known from the Azores, Brazil, France, Italy, Jamaica, Madeira and Portugal.

LECTOTYPE: *France*. In foliis emortuis Platani. Autumno. Desm., Pl. Crypt. France Ed. 2 (2) #372. The specimen at BPI is here designated as the LECTOTYPE. Isolectotypes of the same exsiccati number from BR and UPS were also examined.

OTHER SPECIMENS EXAMINED: *Azores*, Flores, Caldeira Comprida above Fajazinha, on decaying evergreen leaf, 13 April 1978, coll. R. P. Korf, L. M. Kohn, N. Korf, A. Y. Rossman (CUP-MM 2114). *Brazil*, in a forest near Apiaty, on the undersurface of fallen, rotting leaves of Lauraceae, March 1888, Puiggarii #2562 *Ophionectria puiggarii* LECTOTYPE (LPS), ISOLECTOTYPE (FH-Höhnelt); H. P. Rio de Papageio, on leguminous plant, 12 Feb. 1896, Ule #2282 *Nectria leguminum* HOLOTYPE (S), ISOTYPE (FH-Höhnelt). *Italy*, Locarno, on fallen leaves of *Magnolia grandiflora*, coll. Daldini *Calonectria daldiniana* HOLOTYPE (RO-general mycological herbarium). *Jamaica*, Portland Parish, between Silver Hill Gap and Woodcutters Gap, 1500 m, on undersurface of dead leaf, 9 Jan. 1971, coll. R. P. Korf, et al., G. J. Samuels GS 36J, A. Y. Rossman 371 (OSC). *Madeira*, 5.1 km from Terreiro da Luta toward São Gonçalo, in rivulet and adjacent seepages, on decaying leaves of *Pittosporum undulatum*, 24 April 1978, coll. R. P. Korf, L. M. Kohn, N. Korf, A. Y. Rossman (CUP-MM 2407); on twigs of *Acacia* sp. (CUP-MM 2411); Chão dos Louros, 9.5 km S of S. Vicente, 26 April 1978, on dead leaves of Lauraceae, coll. R. P. Korf, L. M. Kohn, N. Korf, A. Y. Rossman (CUP-MM 2462); stream halfway between Vinhaticos and Encumeada, on leaf, 26 April 1978, coll. R. P. Korf, L. M. Kohn, N. Korf, A. Y. Rossman (CUP-MM 2478). *Portugal*, on dead leaves of *Hedera helix*, coll. Torrend #376, ex Herb. Bresadola (S) under the unpublished epithet "*lusitanica*" in *Calonectria*.

*CMD-Difco Corn Meal Agar + 0.2% Dextrose, MA-Difco Malt Agar, PDA-Difco Potato Dextrose Agar.

The genus *Calonectria*, as defined herein on the basis of ascocarp morphology and anamorph, is closely related to *Nectria*. The ascocarp is similar in structure to that of *Nectria haematococca* Berk. & Br. [Anamorph: *Fusarium solani* (Mart.) Sacc.] and *Ophionectria trichospora* (Berk. & Br.) Sacc. [Anamorph: *Antipodium spectabile* Piroz.]. The *Cylindrocladium* states of *Calonectria* species are phialidic with elongate, septate conidia as in *Fusarium* and *Antipodium* but the conidia of *Cylindrocladium* have truncate-rounded ends, rather than a foot cell or apical beak. *Cylindrocladium* species also have a peculiar, apical vesicle borne on a long, sterile filament associated with each conidial head. One species of *Calonectria*, *C. reteaudii* (Bugnicourt) Booth, has an anamorph similar to *Cylindrocladium* but lacks the apical vesicle and is placed in *Cylindrocarpon*, a genus which includes the anamorphs of several *Nectria* species.

As can be seen from the above synonymy, the correct name for the type species of *Calonectria* is *C. pyrochroa*. Of the species previously described in *Calonectria*, the species with *Cylindrocladium* anamorphs have morphologically similar teleomorphs. Many *Calonectria* species having *Cylindrocladium* anamorphs are known as plant pathogens on a variety of hosts causing diseases of conifer and peach seedlings, a root and foliar rot of tea and black rot of peanuts. Seven species with known *Cylindrocladium* anamorphs exist in the literature; they are all quite similar to *Calonectria pyrochroa* differentiated by ascospore and conidial size and septation. Older names of *Calonectria* species for which the anamorphs are not yet known may provide earlier epithets for these pathogenic species.

ACKNOWLEDGEMENTS

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THE SPECIES PROBLEM IN THE PSATHYRELLA CANDOLLEANA COMPLEX

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Summary

Interfertility tests between a large number of collections from both the Old and New Worlds show that there are four breeding groups in the collective species *Psathyrella candolleana*.

Psathyrella candolleana (Fr.) Maire is considered to be a collective species by the morphologist but it is very difficult to distinguish between the component species. Two separate investigations have been carried out one by Galland (1) on isolates collected only in France and the other by Jurand (2) using European and American isolates. The isolates used by Galland were collected mainly in the Oise and Val-d'Oise Departments and were studied morphologically and determined by H. Romagnesi. In the second investigation both breeding tests and morphological studies were done by Jurand.

In the investigation of Galland four breeding groups were found after making interfertility tests between the isolates, (fig. 1). H. Romagnesi (3) has decided to give specific names to these as follows : *P. candolleana* (Fr.) Maire, *P. scotospora* Rom., *P. elegans* Rom. and *P. proxima* Rom.

The isolates studied by Jurand are listed in Fig. 2 and again there were four breeding groups. It was interesting to know if the four breeding groups were the same in the two studies. Representatives of each of the four breeding groups of both studies were mated and checked for clamp connections. The strains used and the results are shown in Fig. 3.

The tables show that *P. candolleana* has been found in several European countries and once in the U.S.A. It is the commonest of the four species in France and England. In contrast 15 of the isolates were of *P. elegans*. *P. elegans* has also been found in France, England and Finland. *P. scotospora* is so far only known from France. *P. proxima* has been found in France and once in the U.S.A.

Discussion

These studies show that *P. candolleana* should be considered as a collective or macrospecies consisting of four intersterile microspecies which are most easily identified by breeding tests. To the morphologist there might be fears that this splitting could be endless but these studies indi-

Fig. I - Strains studied by Galland, all collected by H. Romagnesi

Cultures n°	Place of collection	Year
<i>P. candolleana</i> (Fr. Maire)		
881	Luzarches (Val-d'Oise)	1966
886	"	1966
899	Forêt de Largue (Oise)	1966
943	Forêt d'Halatte (Oise)	1967
944	"	1967
964	Forêt de Compiègne (Oise)	1967
992 B	Luzarches (Val-d'Oise)	1968
994	Coye-la-Forêt (Oise)	1968
995 B	"	1968
996	Forêt d'Halatte (Oise)	1968
1002	Luzarches (Val-d'Oise)	1968
1034	Forêt de Compiègne (Oise)	1969
1035	Luzarches (Val-d'Oise)	1969
1036	"	1969
1041	"	1969
1044	Drancy (Seine-et-Marne)	1969
1051	Villers-Saint Frambourg (Oise)	1969
1071	Coye-la-Forêt (Oise)	1970
1075	Bois de Ver-sur-Launette (Oise)	1970
1085	Vauville (Manche)	1970
1165	Pontarmé (Oise)	1975
1173	Forêt de Compiègne (Oise)	1975
1174	"	1975
<i>P. scotospora</i> Rom.		
874	Paris (Seine)	1966
1032 A	"	1970
1032 B	"	1970
<i>P. proxima</i> Rom.		
876	Luzarches (Val-d'Oise)	1966
999 A	Forêt de Comelles (Oise)	1968
999 B	"	1968
999 C	"	1968
<i>P. elegans</i> Rom.		
1029 A	Coye-la-Forêt (Oise)	1969
1029 B	"	1969
1073	Compiègne (Oise)	1970
1074	Bois de Ver-sur-Launette (Oise)	1970

cate that the four species are widespread and it is likely that further studies will only reveal one or two more species in this complex. This widespread distribution of four morphologically similar (but intersterile) species emphasises the fact that speciation in these agarics is an event affecting the cytoplasm during hyphae fusion and has nothing to do with the morphology of the fruit body. It would seem likely

Fig. 2 - Strains studied by Jurand

Cultures n°	Place of collection	Year	Collector and n°
Group II = <i>P. candolleana</i>			
42	Yorkshire, England	1970	7560 R.W.
43	Surrey, England	1968	3390 P.D.O.
136	Warwickshire, England	1970	575 S.P.
142	Turku, Finland	1971	8375 R.W.
146	Helsinki, Finland	1971	8561 R.W.
171	Kent, Ohio, U.S.A.	1972	2096 F.H.
304	C.B.S. Baarn	1933	Vandendries
330	C.B.S. Baarn	1939	Quintanilha
Group IV = <i>P. scotospora</i>			
300	C.B.S. Baarn	1947	Pinto Lopes
Group III = <i>P. proxima</i>			
178	Michigan, U.S.A.	1972	2217 F.H.
Group I = <i>P. elegans</i>			
24	Cheboygan County, Michigan	1969	6609 R.W.
141	Herefordshire, England	1970	M.R.
145	Turku, Finland	1971	8412 R.W.
160	Michigan, U.S.A.	1972	81096 A.H.S.
161	"	1972	81097 A.H.S.
162	"	1972	81098 A.H.S.
163	"	1972	81099 A.H.S.
165	"	1972	81103 A.H.S.
166	"	1972	81112 A.H.S.
167	"	1972	1974 F.H.
168	"	1972	81113 A.H.S.
169	"	1972	204 R.N.
170	"	1972	208 R.N.
173	"	1972	A.H.S.
175	"	1972	81153 A.H.S.
176	"	1972	81156 A.H.S.
179	"	1972	2194 F.H.

Abréviations : F.H., F. HOSENEY ; R.N., R. NIMKE ; P.D.O., P.D. ORTON
 S.P., S. PORTER ; M.R., M. ROTHEROE ;
 A.H.S., A.H. SMITH ; R.W., R. WATLING.

Fig. 3

	1174 France <i>P. candolleana</i>	1029 France <i>P. elegans</i>	874 France <i>P. scotospora</i>	879 France <i>P. proxima</i>
141 England I	-	+	-	-
142 Finland II	+	-	-	-
178 U.S.A. III	-	-	-	+
300 France IV	-	-	+	-

that these species are fairly recent in origin and have not yet accumulated many morphological differences. Now that the existence of four distinct breeding groups is known it may be possible to find additional characters, especially ecological ones which will aid in their identification.

- (1) Contribution à l'étude du genre *Psathyrella* (Fr.) Quél. (Agaricales). Etude des mycéliums en culture pure. Application du test d'infertilité pour la délimitation d'espèces critiques. Thèse 1973, Univ. de Lyon.
- (2) Breeding biology of the genus *Psathyrella*. Ph. D. Thesis, Univ. of Edinburgh.
- (3) Complément à la contribution à l'étude du G. *Psathyrella* (Fr.) Quél. (Agaricales). Descriptions de quelques espèces de *Drosophila* Quél. *Psathyrella* ss. dilat.). Bull. Soc. Mycol. France 91 ; 137-224, 1975.

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TYPE STUDIES IN THE GENUS PEZIZA. VI. SPECIES DESCRIBED BY C. H. PECK

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My observations on operculate Discomycetes described by C. H. Peck and now referred to the genus *Peziza* are provided below: In cases where species have been recently commented upon in the literature, only the presently accepted name is listed and no further comments are made. Peck's use of the generic name *Peziza* conformed with that of many of his contemporaries, such as Ellis and Cooke; almost all Discomycetes, both members of the Helotiales and Pezizales, were included. The numerous species described under *Peziza* but which now prove to be members of the Helotiales are listed after the more detailed comments. All cited material has been examined.

Peck's publications as New York State Botanist appeared rarely and irregularly. In many cases title page dates are incorrect. The dates given below in parentheses are those listed by J. H. Barnhart (unpublished manuscript in Farlow Library). These are the earliest possible dates at which a given report, in one form or another, was distributed.

I wish to thank Harold J. Larsen, Jr., Richard P. Korf, and especially J. H. Haines for help and suggestions. Dr. Haines particularly provided information on collections from Peck's notebooks.

Peziza adusta Cooke & Peck, Bull. Buffalo Soc. Nat. Sci. 2: 290. 1875, Rep. New York State Bot. 27: 107. 1873. (1875).
= *Humaria adusta* (Cooke & Peck) Sacc., Syll. fung. 8: 141. 1889.
= *Leucoloma adusta* (Cooke & Peck) House, Rep. New York State Mus. 243-244: 86. 1921.

Holotype: On burnt ground. West Albany, N.Y. July 1873. NYS.

Seaver (1928) considered this to be a synonym of *Patella melaloma* (Alb. & Schw.) Seaver which is now referred to *Anthracobia melaloma* (Alb. & Schw.) Boud. Annotations on the specimen by Harold J. Larsen, Jr. indicate that this is a species of *Anthracobia*. In personal communication Dr. Larsen states that he concurs with Seaver's placement of this species though there are some differences between them.

Peziza amplispora (Cooke & Peck) Cooke, Mycographia 1: 167. 1879.

[= *Peziza repanda* var. *amplispora* Cooke & Peck, Bull. Buffalo Acad. Sci. 2: 288. 1876. without description].

= *Geopyxis amplispora* (Cooke & Peck) Sacc., Syll. fung. 8: 71. 1889.

Isotype: On ground. New York State. NYS.

This is a true *Peziza* with amyloid asci but it cannot be distinguished from *P. micropus* Pers. ex Pers.

Peziza bronca Peck, Rep. New York State Mus. 29: 54. 1875. (1878).

= *Tarsetta bronca* (Peck) Korf & J. K. Rogers, Phytologia 21: 206. 1971.

Peziza convoluta Peck, Bull. Torrey Bot. Club 30: 101. 1903, non *P. convoluta* Rodway, 1925.

Holotype: Sandy soil. California. W. R. Dudley NYS.

Though Seaver (1928) placed this species in the synonymy of *Peziza venosa* Pers. (= *Disciotus venosa* (Pers.) Boud.), my studies of the type specimen show this to have amyloid asci. The spores are smooth. This seems close to or identical with *Peziza vesiculosa*.

Peziza (Humaria) deligata Peck, Rep. New York State Mus. 30: 61. 1878.

= *Humaria deligata* (Peck) Sacc., Syll. fung. 8: 123. 1889.

= *Leucoloma deligata* (Peck) House, Bull. New York State Mus. 243-244: 86. 1921.

= *Humarina deligata* (Peck) Seaver, N. Amer. Cup-fungi (operculates). p. 132. 1928.

Holotype: Dead stems of herbs lying on the ground. Bethlehem, Albany County, N.Y. September 1876. NYS.

This is a species of *Iodophanus*. It seems most like *I. testaceus* (Moug. in Fr.) Korf as treated by Kimbrough, Luck-Allen, and Cain (1969).

Peziza dudleyi Peck, Rep. New York State Mus. 47: 23. 1894.

Holotype: Ground and decayed wood. Ithaca, N.Y. October. Dudley. NYS.

Morphologically this is identical to *Sarcoscypha coccinea* as was concluded by Kanouse (1948) who treated it under *Plectania coccinea*.

[*Peziza echinosperma* Peck, Rep. New York State Mus. 24: 95. 1870 (1872), non *Peziza echinosperma* Karst., Not. Fauna Fl. Fenn. 10: 115. 1869].

= *Humaria echinosperma* Peck ex Sacc., Syll. fung. 8: 130. 1889

= *Leucoloma echinosperma* (Peck ex Sacc.) House, Bull. New York State Mus. 243-244: 86. 1921.

Holotype: Damp ground in pastures. West Albany, N.Y. June. NYS.

This is *Lamprospora crec'hqueraultii* (Cr. & Cr.) Boud. It was treated as a synonym of that species by Seaver (1928). John Haines informs me that in his notebook Peck wrote the following comment by M. C. Cooke: "A good species, but bad name."

Peziza gallinacea Peck, Rep. New York State Mus. 31: 135. 1877 (1879).

= *Humaria gallinacea* (Peck) Sacc., Syll. fung. 8: 63. 1889.

= *Leucoloma gallinacea* (Peck) House, Bull. New York State Mus. 243-244: 86. 1921.

This specimen (Partridge dung. Oneida, N.Y. July. Warne) has not been located in the New York State Museum. From the description it seems likely that this is a *Coprotus* species. Seaver (1928) treated it as *Ascophanus gallinaceus* (Peck) Seaver.

Peziza hesperidea Cooke & Peck, Grevillea 1: 5. 1875.

= *Geopyxis hesperidea* (Cooke & Peck) Sacc., Syll. fung. 8: 63. 1889.

Holotype: Amongst leaves. Goat Island, near Niagara Falls, N.Y. NYS.

Seaver (1928) and Kanouse (1948) treated this as a synonym of *Plectania occidentalis* (Schw.) Seaver which is now considered a *Sarcoscypha*.

Peziza humosoides Peck, Rep. New York State Mus. 32: 46. 1878.

(1880).

Type material (On dung of some wild animal, Catskill Mountains, July) could not be located in NYS.

Peziza (Humaria) hydrophila Peck, Rep. New York State Mus. 34: 51. 1880. (1883), non *P. hydrophila* Karst., 1869.

≡ *Humaria hydrophila* Sacc., Syll. fung. 8: 140. 1889 (ut "Peck").

≡ *Leucoloma hydrophila* (Sacc.) House, Bull. New York State Mus. 243-244: 86. 1921 (ut "(Peck) House").

≡ *Psilopezia hydrophila* (Sacc.) Seaver, N. Amer. Cup-fungi (operculates) p. 106. 1928 (ut "(Peck) Seaver").

Holotype: Decaying wood lying in water. Adirondack Mountains. July. NYS.

Earlier (1973b) I stated that this was a *Peziza*, but now after examining a number of *Peziza* species I cannot justify its placement in *Peziza*. It is a species of *Pachyella* which is close to *P. punctispora* Pfister. The new combination *Pachyella hydrophila* (Sacc.) Pfister, comb. nov. (basionym *Humaria hydrophila* Sacc., Syll. fung. 8: 140. 1889 ≡ *Peziza hydrophila* Peck, a later homonym) is proposed.

In both *Pachyella punctispora* and this species the gelatinous material of the medullary excipulum and outer excipulum is scanty and is not easily seen in dried material. Peck's species differs from other *Pezizas* in the presence of this gelatinous excipular material, the presence of textura intricata in the medullary excipulum, and the formation of short pigmented hyphoid excipular hairs. These excipular hairs are not arranged in a palisade layer; in this feature *Peziza hydrophila* Peck agrees with *Pachyella punctispora*. In addition, both species have very densely pigmented paraphyses and ornamented ascospores. They differ only critically. In the holotype of *P. hydrophila* the wide paraphyses (which reach a diam of 15 µm) and the very faintly ornamented ascospores separate it from known collections of *P. punctispora* in which the paraphyses are narrow (under 9 µm in diam) and the ascospores are more prominently marked (see Pfister 1975).

Peziza imperialis Peck, Rep. New York State Mus. 29: 54. 1875 (1878), non *Peziza imperialis* Beck, 1884.

≡ *Sowerbyella imperialis* (Peck) Korf, Phytologia 21: 206. 1971.

Peziza leucobasis Peck, Bull. New York State Mus. 1: 20. 1887.

≡ *Psilopezia deligata* (Peck) Seaver fide Pfister (1973a).

Peziza odorata Peck, Bull. Torrey Bot. Club 23: 420. 1896.

Holotype: Ground in a cellar, Maine. June. F. L. Harvey. NYS.

The type collection agrees in all aspects with *Peziza domiciliana* Cooke. Seaver (1928) had previously treated it as a synonym of *P. domiciliana*.

Peziza orbicularis Peck, Bull. New York State Mus. 1: 20. 1887.

= *Pachyella clypeata* (Schw.) Le Gal fide Pfister (1973).

Peziza ovilla Peck, Rep. New York State Mus. 28: 66. 1874 (1876).

≡ *Leucoscypha ovilla* (Peck) Harmaja, Karstenia 17: 73. 1977.

Peziza pallidula Cooke & Peck, Bull. Buffalo Soc. Nat. Sci. 2: 288. 1876.

≡ *Geopyxis pallidula* (Cooke & Peck) Sacc., Syll. fung. 8: 70. 1889.

Isotype: On old beech wood. Croghan, N.Y. September. NYS.

If one follows Svrcek's treatment of the smooth-spored and related

species of *Peziza*, *P. pallidula* seems indistinguishable from *P. arvernensis* Boud. (= *P. sylvestris* (Boud.) Sacc. & Trav.). *Peziza pallidula* is the older name but there appears to be a species complex involved. In the specimen in NYS all the spores seen were eguttulate. Cooke (1879) stated that some spores were biguttulate.

Peziza pellita Cooke & Peck, *Grevillea* 1: 5. 1872, Rep. New York State Mus. 25: 98. 1873.

≡ *Lachnea pellita* (Cooke & Peck) Sacc., *Syll. fung.* 8: 169. 1889.

≡ *Sepultaria pellita* (Cooke & Peck) Seaver, N. Amer. Cup-fungi (operculates) p. 152. 1928.

Holotype: Thin soil covering rocks. Lower Ausable Falls, Essex County, N.Y. Adirondack Mountains. July. NYS.

This is a member of the genus *Sepultaria*. At present the species concepts within the genus do not allow the placement of this species.

Peziza rubra Peck, Rep. New York State Mus. 24: 95. 1870 (1872). Holotype: Burnt ground. Top of the Hudson Highlands, N.Y. June.

NYS.

This is *Geopyxis carbonaria* (Alb. & Schw. ex Pers.) Sacc.

Peziza subvernalis Peck, Rep. New York State Mus. 33: 31. 1879 (1883).

Holotype: Decaying wood and bark of ash trees, *Fraxinus sambucifolia*. Sandlake, Rensselaer County, N.Y. May. NYS.

This is a smooth-spored species of *Peziza* which seems indistinguishable from *P. ampliata* Pers. ex Pers.

Peziza unicus Peck, Rep. New York State Mus. 26: 81. 1874.

Seaver (1928) treated this as a synonym of *Scodellina leporina*. The holotype (on ground in woods, Croghan, N.Y., September.) is on loan from NYS and has not been studied by me.

Peziza vulcanalis Peck, Haydn's U. S. Geol. Survey p. 792. 1872.

≡ *Geopyxis vulcanalis* (Peck) Sacc., *Syll. fung.* 8: 65. 1889.

Rifai (1968) suggests that this is a synonym of *Geopyxis carbonaria*. I have not studied the material.

Peziza warnei Peck, Rep. New York State Mus. 30: 59. 1878.

≡ *Discina warnei* (Peck) Sacc., *Syll. fung.* 8: 102. 1889, fide McKnight (1969).

The following are species described in *Peziza* which are members of the Helotiales. Most were treated by Seaver (1951). Synonyms are listed in parentheses following the Peck name.

Peziza aberrans Peck (≡ *Belonium aberrans* (Peck) Sacc., = *Belonium andropogonis* (Berk. & Curt.) Sacc. fide Seaver, 1928); *Peziza agrostina* Peck (≡ *Trichopeziza agrostina* (Peck) Sacc., = *Lachnella agrostina* (Peck) Seaver); *Peziza albumina* Cooke & Peck (≡ *Helotium albumineum* (Cooke & Peck) Sacc., = *Calycina albumina* (Cooke & Peck) Kuntze); *Peziza assimilis* Cooke & Peck (≡ *Orbilina assimilis* (Cooke & Peck) Sacc.).

Peziza balsamicola Peck (≡ *Tapezia balsamicola* (Peck) Sacc.).

Peziza capitata Peck (≡ *Trichopeziza capitata* (Peck) Sacc., = *Dasy-scyphus capitata* (Peck) Le Gal); *Peziza cariosa* Peck (≡ *Pyrenopeziza cariosa* (Peck) Sacc.); *Peziza chamaeleonitina* Peck (≡ *Dasy-scypha chamaeleonitina* (Peck) Sacc., = *Atractobolus chamaeleonitina* (Peck) O. Kuntze); *Peziza corneola* Cooke & Peck (= *Heterosphaeria linariae* (Rab.) Rehm fide Sacc., *Syll. fung.* 8: 776. 1889); *Peziza corrugata* (≡ *Durella corrugata* (Cooke & Peck) Sacc.).

Peziza distincta Peck (≡ *Trichopeziza distincta* (Peck) Sacc.).

Peziza enterochroma Peck (≡ *Ombrophila enterochroma* (Peck) Sacc.,

≡ *Kriegeria enterochroma* (Peck) Seaver).

Peziza floriformis Peck (≡ *Pezizella floriformis* (Peck) Sacc.).

Peziza kalmiae Peck (≡ *Pezicula kalmiae* (Peck) Sacc.).

Peziza lacerata Cooke & Peck (≡ *Pyrenopeziza lacerata* (Cooke & Peck) Sacc.); *Peziza longipes* (≡ *Phialea longipes* (Cooke & Peck) Sacc.); *Peziza longipila* Peck (≡ *Dasyscypha longipila* (Peck) Sacc., = *Trichopezizella relicina* (Fr.) Raitv. in Haines 1974); *Peziza luteodisca* Peck (≡ *Dasyscypha luteodisca* (Peck) Sacc.; *Atractobolus luteodiscus* (Peck) O. Kuntze).

Peziza myricacea Peck (≡ *Trichopeziza myricacea* (Peck) Sacc.).

Peziza pinastri Cooke & Peck (≡ *Mollisia pinastri* (Cooke & Peck) Sacc., = *Cenangium acuum* Cooke & Ellis); *Peziza planodisca* Cooke & Clint. (≡ *Pezizella planodisca* (Cooke & Clint.) Sacc., = *Hymnoscypha planodisca* Lindau in Engler & Prantl, = *Helotium planodiscum* (Peck & Cooke) White).

Peziza scripina Peck (≡ *Mollisia scripina* (Peck) Sacc.); *Peziza singularis* Peck (≡ *Mollisia singularis* (Peck) Sacc., = *Pseudopeziza singularis* (Peck) Davis); *Peziza solenia* Peck (≡ *Solenopeziza solenia* (Peck) Sacc., = *Dasyscyphus solenia* (Peck) Dennis, = *Lachnella solenia* (Peck) Seaver, = *Belonidium solenia* (Peck) Raitv.); *Peziza sphaerella* Peck & Clint.; *Peziza subatra* Cooke & Peck (≡ *Pyrenopeziza subatra* (Cooke & Peck) Sacc.); *Peziza subcarnea* Cooke & Peck (≡ *Phialea subcarnea* (Cooke & Peck) Sacc., = *Hymenoscyphus subcarnea* (Cooke & Peck) O. Kuntze, = *Helotium destructor* White); *Peziza subcinerea* Cooke & Peck; *Peziza subochracea* Cooke & Peck (≡ *Trichopeziza subochraceae* (Cooke & Peck) Sacc., = *Lachnella subochracea* (Cooke & Peck) Seaver, = *Calycella subochracea* (Cooke & Peck) Dennis); *Peziza sulphurella* Peck (≡ *Dasyscypha sulphurella* (Peck) Sacc., a synonym of *Dasyscyphus cruciferus* (Phill.) Sacc. according to Seaver (1951) and Dennis (1962)).

Peziza tetraonalis Peck.

Peziza thaliotri Peck (≡ *Pyrenopeziza thaliotri* (Peck) Sacc.); *Peziza tiliae* Peck (≡ *Trichopeziza tiliae* (Peck) Sacc., = *Cyphella tiliae* (Peck) Cooke, = *Lachnella tiliae* (Peck) W. B. Cooke); *Peziza typhae* Peck.

Peziza urticina Peck (≡ *Trichopeziza urticina* (Peck) Sacc., = *Dasyscyphus grevillei* (Berk.) Massee fide Dennis 1963).

Peziza vineta Cooke & Peck (≡ *Tapesia vineti* (Cooke & Peck) Sacc.); *Peziza viridicoma* Peck (≡ *Trichopeziza viridicoma* (Peck) Sacc., = *Lachnella viridicoma* (Peck) Seaver).

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TYPE STUDIES IN THE GENUS PEZIZA. VII. MISCELLANEOUS SPECIES DESCRIBED BY M. J. BERKELEY AND M. A. CURTIS.

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Species of *Peziza* described by Berkeley and Curtis are listed below. In cases where specimens have recently been studied the resulting new combinations have been listed without comment. In other cases the results of my studies of specimens are included. In these instances complete specimen citations have been given. The Berkeley and Curtis *Pezizas* described from the *United States North Pacific Exploring Expedition* were previously covered in this series (Pfister, 1977).

I am again indebted to Drs. Richard P. Korf and Harold J. Larsen, Jr. for comments on the manuscript. The Director, Royal Botanic Gardens, Kew kindly lent specimens for study.

Peziza adnata Berk. & Curt. in Berk., J. Linn. Soc. London 10: 365. 1868.

≡ *Pachyella adnata* (Berk. & Curt. in Berk.) Pfister, Can. J. Bot. 51: 2011. 1973.

Peziza albo-cincta Berk. & Curt. in Berk., Grevillea 3: 154. 1875.

≡ *Leucoscypha albo-cincta* (Berk. & Curt. in Berk.) Rifai, Verh. K. Ned. Akad. Wet. II, 57(3): 168. 1968.

Peziza albo-tecta Berk. & Curt. in Berk., J. Linn. Soc. London 10: 367. 1868.

≡ *Neottiella albo-tecta* (Berk. & Curt. in Berk.) Sacc., Syll. fung. 8: 191. 1889.

On earth in savannahs. C. Wright. Cuba. FH-Curtis (isotype).

Study of the specimen indicates that this is a member of the lichen genus *Baeomyces*.

Peziza bella Berk. & Curt. in Berk., J. Linn. Soc. London 10: 366. 1868.

≡ *Nanoscypha bella* (Berk. & Curt. in Berk.) Pfister, J. Agric. Univ. Puerto Rico 58: 361. 1974.

Peziza brassicaecola Berk., Grevillea 3: 157. 1875.

≡ *Pezizella brassicaecola* (Berk.) Sacc., Syll. fung. 8: 283. 1889.

On dead cabbage stems. New England. Sprague. no. 5407. K.

Examination of the holotype shows that this is *Pseudombrophila deerata* (Karst.) Seaver. Annotations with the specimen show that Dr. J. A. Nannfeldt reached the same conclusion some years ago. The species is known from several localities in New England.

Peziza cremoricolor Berk., Grevillea 3: 151. 1875.

On human ordure. Car. Inf. no. 1748.

I have not seen a collection of this species nor have others in re-

cent years. It seems not to be available from K. It was not mentioned by Kimbrough in his various papers on dung-inhabiting fungi. Seaver (1928) placed this species questionably in the synonymy of *Ascophanus ochraceus* (Cr.) Boud.

Peziza crispata Berk. & Curt. in Berk., J. Linn. Soc. London 10: 367. 1868.

≡ *Phillipsia crispata* (Berk. & Curt. in Berk.) Le Gal, Prod. Fl. Mycol. Madagascar 4: 262. 1953.

Peziza cubensis Berk. & Curt. in Berk., J. Linn. Soc. London 10: 366. 1868.

≡ *Scutellinia cubensis* (Berk. & Curt. in Berk.) Gamundi, Contr. Cient. Univ. B. Aires, Ser. Bot. 1(2): 84. 1956.

Peziza decolorans Berk. & Curt. in Berk., Grevillea 3: 150. 1875. On the ground. Alabama. Peters. no. 6059. FH-Curtis, K.

The asci of this small species are J+. The ascospores are biguttulate, 16 - 17 x 7 - 8 μ m and are intricately marked with a series of ridges and crests which form a pronounced, more or less incomplete reticulum. The condition of the material does not allow proper study of the apothecial anatomy. It was said to be white and then discolored with age.

Peziza dochmia Berk. & Curt. in Berk., J. Linn. Soc. London 10: 364. 1868.

≡ *Aurophora dochmia* (Berk. & Curt. in Berk.) Rifai, Verh. K. Ned. Akad. Wet. II, 57(3): 52. 1968.

This is the type species of the genus *Aurophora* Rifai which is distinguished from *Phillipsia* by its fan-shaped apothecia and the presence of a gelatinous matrix in the medullary excipulum. *Peziza hirmeoloides* Berk. and *Peziza inaequalis* Berk. & Curt. in Berk. are said by Rifai to be related.

Peziza elachroa Berk. & Curt. in Cooke, Mycographia p. 160. f. 274. 1879.

On earth amongst leaves. Cuba. C. Wright (? 410). K.

This species of *Peziza* shares a series of characters with several other closely related species. The ascospores are brownish, ornamented with rounded warts or ridges, and apiculate. In this collection the ascospores are (15) 16 - 18 x 10 - 12 μ m and ornamented with short, low anastomosing ridges. The apiculi are up to 5 μ m wide at their base and up to 5 μ m long. The portion of the holotype I examined is composed of parts of two apothecia, the larger of them reaching a diam of about 0.5 cm. The sterile tissue of the apothecia is almost completely collapsed but is darkly colored. The collection is said to have been "greenish" when fresh. The apothecia are sessile.

There are four other species with which this species must be compared: *P. apiculata* Cooke, *Aleuria reperta* Boud., *P. thozetii* Berk., and *Aleurina subapiculata* von H. All of these species form small apothecia which were variously described as brownish to olivaceous. All have ascospores with similar ornamentations and unfortunately none of these species have been often collected. I have seen type material of all of these but *A. reperta*.

Malençon (1939) has discussed *Peziza apiculata*. A summary of his description of that species (under the name *Aleuria apiculata*) follows:

Apothecia 8 - 18 mm broad, subturbinate-cupulate, "cannelle" or bister, on wood of *Quercus*. Asci cylindrical, somewhat attenuated at the base, 300 - 325 x 14 - 15 μ m, J+. Paraphyses slender, 3 - 3.5 μ m broad,

hyaline or lightly fuscous. Ascospores ellipsoidal, remaining smooth and hyaline for a long time, at maturity apiculate and finely verrucose, perispore brownish. Spores without apiculus $17 - 20 \times 9 - 10 \mu\text{m}$. Apiculus $3 - 3.5 \times 2.5 - 6 \mu\text{m}$ high.

There is a collection from North America in FH which matches this description (on wood, Ocala, Fla., R. Thaxter, 1897-1898, det. E. J. Durand). In this material the hymenium was said to be olive.

For *Peziza apiculata* and *Aleuria reperta*, which Malençon concluded differed in its green color and larger ascospores ($22 - 23 \times 9 - 11 \mu\text{m}$ without the apiculus), he proposed a new section of the genus *Aleuria*, sect. *Aleurodiscina*.

Though *P. elachroa* was said to be greenish the spores are too small to be considered *A. reperta* and, though the spore dimension is within the general range of *P. apiculata* they are wider than those of *P. apiculata* and are marked differently. In *P. apiculata* the markings are always in the form of rounded warts with few, if any, anastomosing warts. In *P. elachroa* the warts often anastomose and sometimes form an irregular incomplete reticulum.

The markings in *P. elachroa* most closely resemble those found in *P. thozetii* Berk. as redescribed by Rifai (1968). Nonetheless, the two differ in their spore size; the ascospores of *P. thozetii* measuring (20-) $23.5 - 26.7 \times 9 - 11 \mu\text{m}$.

The fourth species involved, *P. subapiculata*, is known only from the type collection from Tjibodas, Java. In that collection the ascospores are $21 - 23 \times 9.4 \mu\text{m}$ and have fairly prominent apiculi. In the holotype (FH) the asci are J-. The collection was described as dark olive brown to blackish and $5 - 7 \text{ mm}$ broad. Other than the J- asci, this collection seems quite close to *P. thozetii*.

The rather poor condition of these collections makes anatomical comparisons difficult. Also it is difficult to judge if all the materials are fully mature. The key which follows may serve to tentatively distinguish these four species, but it should be pointed out that detailed studies of the species must be carried out when better materials become available. The interspecific variation is unknown at present.

1. Ascospores with long pointed apiculi, with isolated, rounded warts; on dead wood..... 2
- 1¹ 1. Ascospores with $\pm$ blunt apiculi with anastomosing and elongated warts, on ground and associated with plant debris..... 3
2. Ascospores $17 - 20 \times 9 - 10 \mu\text{m}$ (without apiculi) lateral walls prominently warted, disc brownish (perhaps dark olive), sessile..... *P. apiculata*
2. Ascospores $22 - 23 \times 9 - 11 \mu\text{m}$ (without apiculi) disc olivaceous, substipitate..... *P. reperta*
3. Ascospores $16 - 18 \times 10 - 12 \mu\text{m}$ (without apiculi)... *P. elachroa*
- 3¹ 1. Ascospores $23.5 - 26.7 \times 9 - 11 \mu\text{m}$ (without apiculi)..... *P. thozetii*

Moravec's (1977) description of *Peziza apiculata* from Moravia is based upon another fungus, perhaps a *Thecotheus* species. I have seen a small portion of his material through the courtesy of Dr. Henry Dissing at the Institute for Sporeplanter, University of Copenhagen.

- Peziza exasperata* Berk. & Curt. in Berk., *Grevillea* 3: 152. 1875.
 $\equiv$ *Barlaea exasperata* (Berk. & Curt. in Berk.) Sacc., *Syll. fung.* 8: 112. 1889.
 $\equiv$ *Lamprospora exasperata* (Berk. & Curt. in Berk.) Seaver, *N. Amer.*

Cup-fungi (operculates) p. 75. 1928.

On burnt earth. Alabama. Peters. FH-Curtis.

The asci of *Peziza exasperata* are diffusely J+ which would indicate that the species should be referred to the Pezizaceae. Seaver did not use this feature and therefore misplaced the species in *Lamprospora* (Pyronemataceae). The ascospores of *P. exasperata* are globose, 12 - 13 μ m in diam and are marked with warts and ridges. In their size and ornamentation they most closely resemble *Plicaria recurva* (Berk.) Rifai. That species was described as reddish brown as was *P. exasperata*. *Plicaria recurva* was first described from Tasmania by Berkeley in 1860.

Peziza globifera Berk. & Curt. in Berk., J. Linn. Soc. London 10: 366. 1868.

= *Pulvinula globifera* (Berk. & Curt. in Berk.) Le Gal, Prod. Fl. Mycol. Madagascar 4: 94. 1953, see Pfister 1976.

Peziza hirneoloides Berk., J. Linn. Soc. London 10: 365. 1868.
For comments on this species see *Peziza dochmia*.

Peziza inaequalis Berk. & Curt. in Berk., J. Linn. Soc. London 10: 365. 1868.

For comments on this species see *Peziza dochmia*.

Peziza irrorata Berk. & Curt. in Berk., Grevillea 3: 150. 1875.
On soil. Texas. C. Wright no. 3138. FH-Curtis.

This is a true *Peziza*. The ascospores are broad ellipsoid to almost subglobose, uniguttulate, 12 - 14 x 8 - 9 μ m, ornamented with distinct warts and ridges which are up to 2 μ m high. Asci J+ at tip, 240 - 260 x 13 - 14 μ m. Paraphyses somewhat indistinct, brownish by transmitted light, up to 6 μ m broad. The apothecia in the type collection range from 0.5 - 1.5 cm in diam and are dull brown when dried. Little can be determined of the apothecial anatomy.

Peziza lobata Berk. & Curt. in Berk., J. Linn. Soc. London 10: 365. 1868.

= *Lamprospora lobata* (Berk. & Curt. in Berk.) Seaver, Mycologia 6: 22. 1914, see also Dennis, Kew Bull. 9: 418. 1954.

Peziza microspora Berk. & Curt. in Berk., Grevillea 3: 150. 1875.

= *Humaria microspora* (Berk. & Curt. in Berk.) Sacc., Syll. fung. 8: 131. 1889.

= *Acervus epispartius* (Berk. & Curt. in Berk.) Pfister, (1975).

Peziza monilifera Berk. & Curt. in Berk., J. Linn. Soc. London 10: 367. 1868.

= *Pyronemella monilifera* (Berk. & Curt. in Berk.) Sacc., Syll. fung. 8: 194. 1889.

= *Sphaerospora monilifera* (Berk. & Curt. in Berk.) Seaver, N. Amer. Cup-fungi (operculates) p. 47. 1928.

Tewari and Pant (1968) discuss some of the problems regarding this species. They describe an Indian collection of this species which they treat as *Pyronemella monilifera*. The status of *Pyronemella* is questionable as stated previously (Pfister 1978).

Peziza palmicola Berk. & Curt. in Berk., J. Linn. Soc. London 10: 364. 1868.

= *Discina palmicola* (Berk. & Curt. in Berk.) Sacc., Syll. fung. 8: 100. 1889.

On rotten Palms. February. C. Wright (300). Cuba. FH-Curtis.

The asci are J+, the ascospores are eguttulate with smooth, thick walls. The ascospores are 17 - 19 x 9 - 11 μ m. The apothecia seen are

poorly preserved and it is impossible to discern any structural detail. The apothecium is about 2 cm diam.

Peziza petersii Berk., *Grevillea* 3: 150. 1875.

≡ *Galactinia petersii* (Berk.) Le Gal, *Prod. Fl. Mycol. Madagascar* 4: 51. 1953.

On burnt soil. Alabama. Peters. no. 6063.

This species was treated by Seaver (1928) under the name *Peziza pustulata*. Rifai (1968) provides a detailed description of this *Peziza*.

Peziza pubida Berk. & Curt. in Berk., *Grevillea* 3: 153. 1875.

≡ *Macropodia pubida* (Berk. & Curt. in Berk.) Sacc., *Syll. fung.* 8: 159. 1889.

= *Jafnea fusicarpa* (Gerard) Korf, *Nagaoa* 7: 5. 1960, fide Korf.

Peziza pusio Berk. & Curt. in Berk., *Grevillea* 3: 153. 1875.

≡ *Sarcoscypha pusio* (Berk. & Curt. in Berk.) Sacc., *Syll. fung.* 8: 155. 1889.

Rooting into the soil, the particles of which it binds together. Texas. C. Wright. no. 3145. K.

This is a small specimen of *Sarcoscypha occidentalis*. Masse (J. Linn. Soc. London 31: 509. 1896) said, "Has all the characters of *Stammaria*."

Peziza scatigena Berk. & Curt. in Berk., *J. Linn. Soc. London* 10: 366. 1868.

≡ *Ascobolus scatigenus* (Berk. & Curt. in Berk.) Brumm., *Persoonia Suppl.* 1: 159. 1968.

Peziza semitosta Berk. & Curt. in Berk., *Grevillea* 3: 153. 1875.

≡ *Jafnea semitosta* (Berk. & Curt. in Berk.) Korf, *Nagaoa* 7: 5. 1960.

Peziza sordescens Berk. & Curt. in Berk., *Grevillea* 3: 150. 1875.

≡ *Geopyxis sordescens* (Berk. & Curt. in Berk.) Sacc., *Syll. fung.* 8: 69. 1889.

On soil, over which a thin mycelium is spread which binds together the particles. New England. Murray. no. 5327. FH-Curtis, FH-Sprague. This appears to be *Otidea grandis* (Pers.) Rehm.

Peziza spissa Berk., *Grevillea* 3: 152. 1875.

On the ground. Alabama. Peters. no. 6074. K.

The portion of the holotype examined consisted of a single poorly preserved apothecium which was barely mature. Spores are biguttulate 24 - 26 x 13 μm, and are marked with very low isolated warts. The paraphyses are light brown and about 5 μm in diam.

The material does not allow precise placement of this species but it seems likely that, despite its reported occurrence on soil, it is a species of *Pachyella* close to *P. punctispora* Pfister and *Pachyella hydrophila* (Sacc.) Pfister. In these species characteristic gel is difficult to detect without special treatment (Pfister, 1973).

Peziza spraguei Berk. & Curt. in Cooke, *Bull. Buffalo Acad. Sci.* 2: 289. 1876.

≡ *Neottiella spraguei* (Berk. & Curt. in Cooke) Sacc., *Syll. fung.* 8: 190. 1889.

≡ *Rhizina spraguei* (Berk. & Curt. in Cooke) Massee, *J. Linn. Soc. London* 10: 365. 1868.

≡ *Galactinia spraguei* (Berk. & Curt. in Cooke) Le Gal, *Bull. Soc. Mycol. France* 78: 208. 1962.

On decayed wood. S. Paris, Maine (5325) (Sprague no. 268) [Aug. 1855].

(Specimen designated as type by Le Gal 1959) K. Isotype FH-Curtis.

Of the three collections cited by Cooke in the original description (New England, Carolina, and Maine) Le Gal selected the Maine specimen as type. Le Gal examined this species and compared it with *Galaetinia luteorosella* Le Gal and concluded that they differed in spore size and the form of the paraphyses. In my examination of this material I find that the spores are smooth, $14 - 18 \times 8 - 10 \mu\text{m}$, and eguttulate though occasionally they are irregularly guttulate with small refractive droplets. The material both at K and FH are so poorly preserved that it is impossible to study the excipulum. The species thus cannot be adequately placed yet its broad attachment to the substrate seems distinctive.

Peziza stictica Berk. & Curt. in Berk., J. Linn. Soc. London 10: 367. 1868.

≡ *Lachnea stictica* (Berk. & Curt. in Berk.) Sacc., Syll. fung. 8: 177. 1889.

On the ground by the side of paths. June. C. Wright (643). Cuba. FH-Curtis.

This is a member of the genus *Scutellinia*.

Peziza stygia Berk. & Curt. in Berk., Grevillea 3: 153. 1875.

≡ *Pseudoplectania stygia* (Berk. & Curt. in Berk.) Sacc., Syll. fung. 8: 166. 1889.

Sides of moist banks amongst moss. Car. Inf. no. 2971. FH-Curtis.

This is *Pseudoplectania nigrella* (Pers. ex Fr.) Fuckel, according to Seaver (1928).

Peziza subgranulata Berk. & Curt. in Berk., J. Linn. Soc. London 10: 366. 1868.

≡ *Humaria subgranulata* (Berk. & Curt. in Berk.) Sacc., Syll. fung. 8: 129. 1889.

On dung. C. Wright (370). Cuba. FH-Curtis.

Peziza subgranulata was originally described as follows: "Applanata, lutea, margine setis pallidis obsito; sporidiis granulatis. On dung. Resembling *P. granulata*, Bull.; but in that the sporidia are smooth and .0006 inch long, in this granulated and .001 inch long."

Examination of Curtis specimens yields the following information: Asci are diffusely J+, approximately $200 \times 28 - 32 \mu\text{m}$ (the asci are badly collapsed). The ascospores are $24 - 27.5 \times 14 - 17 \mu\text{m}$ and are marked with low lateral warts and larger polar warts. The warts have more or less parallel sides and flat tops.

This fungus is identical to *Iodophanus granulipolaris* Kimb. and provides an older name for it. The following combination is necessary: *IODOPHANUS SUBGRANULATUS* (Berk. & Curt. in Berk.) Pfister comb. nov. (basionym *Peziza subgranulata* Berk. & Curt. in Berk., J. Linn. Soc. London 10: 366. 1868).

Peziza texensis Berk. & Curt. in Berk., Grevillea 3: 154. 1875.

≡ *Lachnea texensis* (Berk. & Curt. in Berk.) Sacc., Syll. fung. 8: 182. 1889.

≡ *Scutellinia texensis* (Berk. & Curt. in Berk.) Le Gal, Prod. Fl. Mycol. Madagascar 4: 133. 1953.

Peziza wrightii Berk. & Curt. in Berk., Ann. Mag. Nat. Hist., III 15: 444. 1865.

≡ *Lamprospora wrightii* (Berk. & Curt. in Berk.) Seaver, Mycologia 6: 15. 1914.

≡ *Octospora wrightii* (Berk. & Curt. in Berk.) J. Moravec, Česká My-

kologie 23: 227. 1969.

There is some problem in the interpretation of this species which in part is due to selection of type specimens. Dennis and Itzeroti (1973) selected, from the two original specimens mentioned, the collection from Bodelwyddan, North Wales, on *Amblystegia serpens*. Later, Khare (1976) selected, as type, and described material collected by Charles Wright in Texas, deposited in FH-Curtis. This collection (According to Henry Dissing, personal communication) occurs on a different moss and represents a different taxon. Dennis and Itzeroti's interpretation of *Peziza wrightii* should be followed.

The following species are members of the Helotiales. Synonyms are listed in parentheses.

Peziza Agassizii Berk. & Curt. (= *Lachnellula Agassizii* (Berk. & Curt.) Dennis); *Peziza alphetodes* Berk. (? = *Lachnum pygmaeum* fide White in Litt.); *Peziza andropogonis* Berk. & Curt. in Berk. (= *Belonium andropogonis* (Berk. & Curt. in Berk.) Sacc.); *Peziza arundinariae* Berk. & Curt. in Cooke non *Peziza arundinariae* Berk. (= *Pyrenopeziza arundinariae* (Berk. & Curt. in Cooke) ex Sacc.); *Peziza arundinariae* Berk. non *Peziza arundinariae* Berk. & Curt. in Cooke (= *Dasyascypha arundinariae* (Berk.) Sacc.); *Peziza atro-fusca* Berk. & Curt. in Berk. (= *Tapesia atro-fusca* (Berk. & Curt. in Berk.) Sacc.).

Peziza crocina Berk. & Curt. in Berk. (= *Calycella citrina* (Hedw. ex Fr.) Quél. fide Dennis, 1954); *Peziza crocincta* Berk. & Curt. in Berk. (= *Chlorosplenium chlora* (Schw.) Curtis in Sprague fide Dixon, 1974).

Peziza eustegiaeformis Berk. & Curt. in Berk. (= *Belonium eustigiaeformis* (Berk. & Curt. in Berk.) Sacc.); *Peziza exarata* Berk. (= *Phialea exarata* (Berk.) Sacc.); *Peziza exidiella* Berk. & Curt. in Berk. (= *Pezizella exidiella* (Berk. & Curt. in Berk.) Sacc.); *Peziza extricata* Berk. & Curt. in Berk. (= *Pyrenopeziza extricata* (Berk. & Curt. in Berk.) Dennis).

Peziza fibriseda Berk. & Curt. in Berk. (= *Pseudohelotium fibriseda* (Berk. & Curt. in Berk.) Sacc.); *Peziza fimbriifera* Berk. & Curt. in Berk. (= *Dasyascypha fimbriifera* (Berk. & Curt. in Berk.) Sacc.); *Peziza fracta* Berk. & Curt. in Berk. (= *Pyrenopeziza fracta* (Berk. & Curt. in Berk.) Sacc.).

Peziza hypophylla Berk. & Curt. in Berk. (= *Pocillum hypophyllum* (Berk. & Curt. in Berk.) Sacc.).

Peziza illota Berk. & Curt. in Berk. (= *Dasyascypha illota* (Berk. & Curt. in Berk.) Sacc. = *Dasyascypha brasiliensis* (Mont.) Le Gal fide Dennis (1954)); *Peziza inspersa* Berk. & Curt. in Berk. (= *Lachnellula inspersa* (Berk. & Curt. in Berk.) Dennis).

Peziza melanopus Berk. & Curt. in Berk. (= a *Hymenoscyphus* species); *Peziza miltothralma* Berk. & Curt. in Berk. (= an inoperculate discomycete).

Peziza nigro-cincta Berk. & Curt. in Berk. (= *Mollisia nigro-cincta* (Berk. & Curt. in Berk.) Dennis, 1963).

Peziza pomicolor Berk. & Rav. in Berk. (= *Trichopeziza pomicolor* (Berk. & Rav. in Berk.) Sacc.); *Peziza protrusa* Berk. & Curt. in Berk. (= *Pyrenopeziza protrusa* (Berk. & Curt. in Berk.) Sacc.); *Peziza puberula* Berk. & Curt. in Berk. (= *Dasyascyphus subauratus* (Ellis) Dennis fide Dennis, 1963).

Peziza quisquiliarum Berk. & Curt. in Berk. (= *Belonium quisquiliarum* Berk. & Curt. in Berk.) Seaver).

Peziza raphidophora Berk. & Curt. in Berk. (= *Dasyascypha raphidophora* (Berk. & Curt. in Berk.) Dennis); *Peziza Ravenelii* Berk. & Curt. in Berk. (= *Unguiculariopsis ilicincola* Rehm fide Seaver); *Peziza Russellii* Berk.

& Curt. in Berk. ($\equiv$ *Helotiella Russellii* (Berk. & Curt. in Berk.) Sacc.).

Peziza saccharifera Berk. ($\equiv$ *Pseudohelotium sacchariferum* (Berk.) Sacc.); *Peziza scariosa* Berk. & Curt. in Berk. ($\equiv$ *Tapesia scariosa* (Berk. & Curt. in Berk.) Sacc.); *Peziza soleniformis* Berk. & Curt. in Berk. ($\equiv$ *Pezizella soleniformis* (Berk. & Curt. in Berk.) Sacc.); *Peziza stenostoma* Berk. & Curt. in Berk., non *Peziza stenostoma* Mart. ex Fr. (= an inoperculate discomycete);

Peziza taxodii Berk. ($\equiv$ *Blitrydium taxodii* (Berk.) Sacc.); *Peziza tela* Berk. & Curt. in Berk. ($\equiv$ *Cyphella tela* (Berk. & Curt. in Berk.) Massee); *Peziza translucida* Berk. & Curt. in Berk. (= *Pezizella vulgaris* (Fr.) von H. fide Dennis, 1953).

Peziza umbilicata Berk. & Curt. in Berk., non *Peziza umbilicata* Pers., nec P. *umbilicata* Karst. (= *Velutaria rufo-olivacea* (Alb. & Schw. ex Fr.) Korf fide Dennis, 1963); *Peziza ustalis* Berk. & Curt. in Berk. ($\equiv$ *Cenangium ustale* (Berk. & Curt. in Berk.) Sacc.).

Peziza viridi-atra Berk. & Curt. in Berk. ($\equiv$ *Pezicula viridi-atra* (Berk. & Curt. in Berk.) Sacc.).

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ENTROPHOSPORA, A NEW GENUS IN THE ENDOGONACEAE

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Fungal spores which closely resembled *Glomus infrequens* Hall (1977) were wet sieved from a celery field soil in California. However, the mode of spore formation is unlike any described for the genera of Endogonaceae (Gerdemann and Trappe, 1974). Initially, a vesicle similar to that of *Acaulospora* spp. (Gerdemann and Trappe, 1974; Ames and Linderman, 1976; Trappe, 1977) is formed but the spore develops inside the vesicular stalk rather than laterally. No hyphae have been observed within the vesicle or vesicular stalk to indicate the presence of two fungi. In all other respects, the spores matched *G. infrequens* as contained in the type collections of Hall (Hall #437, 1, and 30, DSIR, Auckland, N.Z.). Specimens from our collections were sent to I. R. Hall and J. M. Trappe for observation. Personal communications from them supported our view that *G. infrequens* was incompletely described and should be placed in another genus in the Endogonaceae. Therefore, we are describing the new genus, *Entrophospora*, with *E. infrequens* (Hall) Ames & Schneider comb. nov. as the type species.

Entrophospora infrequens is similar to *Acaulospora* spp. (Gerdemann and Trappe, 1974) in the shape and color of the spore-producing vesicle. Even the pointed projection frequently observed at the apex of the vesicle has been observed for *E. infrequens*. The spores, which form inside the stalk of the vesicle, remain enclosed by the expanded vesicular wall material even though the spore may become detached from the vesicle itself. Mycorrhiza formation has not been established with *E. infrequens* despite numerous attempts.

ENTROPHOSPORA Ames & Schneider, gen. nov.

Type species: *Entrophospora infrequens* (Hall) Ames &

Schneider comb. nov.

DESCRIPTION: Azygosporae singillatim in terra ortae, in vesiculae stipite crescentes. Vesiculae exili tunica, principio densae albaeque, deinde exhauriuntur dum materia in adolescentem sporam transfertur. Crescente spora, tunica stipitis panditur et membrana fit hyalina sporaque appressa. Sporae tunica continua excepto poro densa materia occluso qui, forma fundibuli, vesiculam init.

Azygospores produced singly in soil by expansion within the stalk of the mother vesicle. Mother vesicle thin walled, dense white, becoming empty as contents are transferred to developing spore. Walls of vesicular stalk expand to accommodate spore, forming a clear outer membrane tightly appressed to the spore. Spore wall continuous except for funnel-shaped portion which extends into the mother vesicle and is closed by a thickened plug.

ETYMOLOGY: Greek, en (within), trophos (nourished or reared), and spora (spore), referring to the spore being reared within the vesicular stalk.

ENTROPHOSPORA INFREQUENS (Hall) Ames & Schneider comb. nov. (Figs. 1 and 2) $\equiv$ *Glomus infrequens* Hall. Trans. Br. mycol. Soc. 68(3):345-347 (1977).

DESCRIPTION: Sporocarpia ignota. Azygosporae singillatim in terra ortae, crescens quaeque hyphali in cellula, levi nec ramosa, quae in vesicula subglobosa terminatur vel ellipsoidea sive obovoida 126-214 x 157-227 μ m diametro. Vesiculae, densa primo albaque materia, paulatim in adolescentem sporam exhaustae. Sporae principio albae, deinde obscure luteae vel brunneae, 69-183 (-225) x 69-164 μ m diametro, subglobosae vel ellipsoideae, tunica hyalina stipitis vesicularis inclusae, quae 2.5-10.0 μ m crassitudinis habet. Eis tunica simplex, ut videtur, spinis (sive digitis) vacuis et 2.5-5.0 μ m longitudine extentis, spissis ac perpetuis excepto poro qui forma fundibuli vesiculam init et densa tunicae materia occlusus est. Interior-em sporae materiam exilis membrana continet. Quomodo sporae germinent, utrum mycorrhizae formentur, adhuc ignotum.

Sporocarps unknown. Azygospores produced singly in soil by expansion within a smooth, unbranched hyphal cell that terminates in a subglobose to ellipsoid or obovoid vesicle, 126-214 X 157-227 μ m diam.; vesicle contents dense white, emptying as the spore develops. Spores white

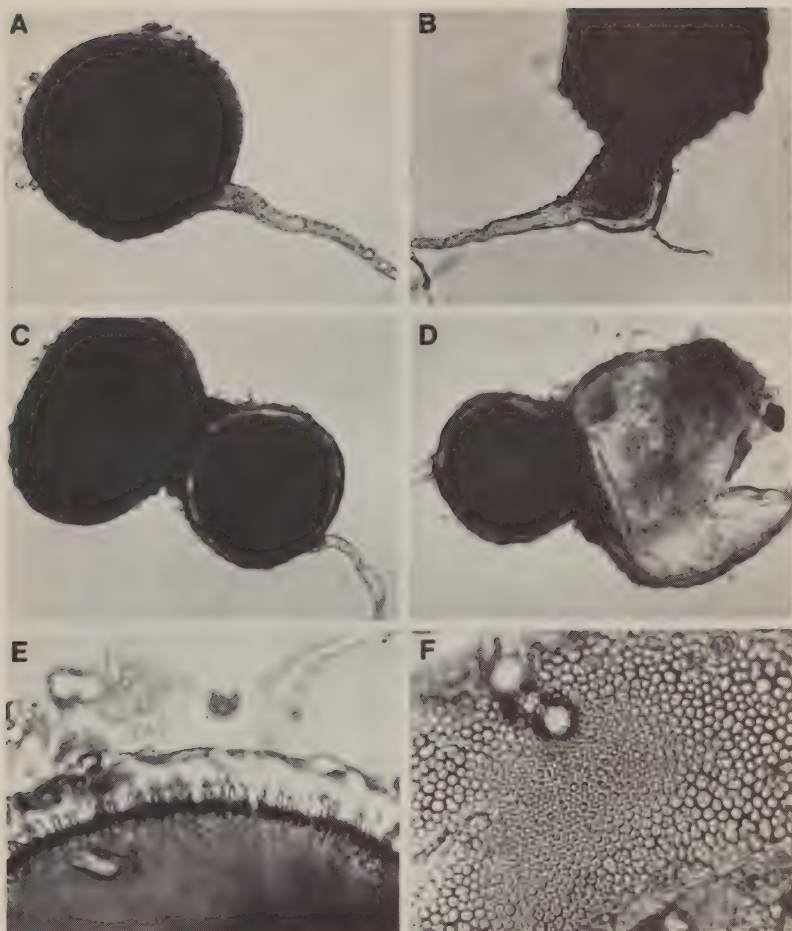


Fig. 1. (A-D) Fresh specimens mounted in water, X 160. (A) Vesicle prior to spore formation. (B) Developing spore within vesicular stalk. (C) Young spore and vesicle. (D) Mature spore with attached empty vesicle. (E-F) Squashed spore mounted in water, X 800. (E) Optical cross section showing vacuolated projections of inner spore wall and clear outer membrane. (F) Surface view of inner spore wall.

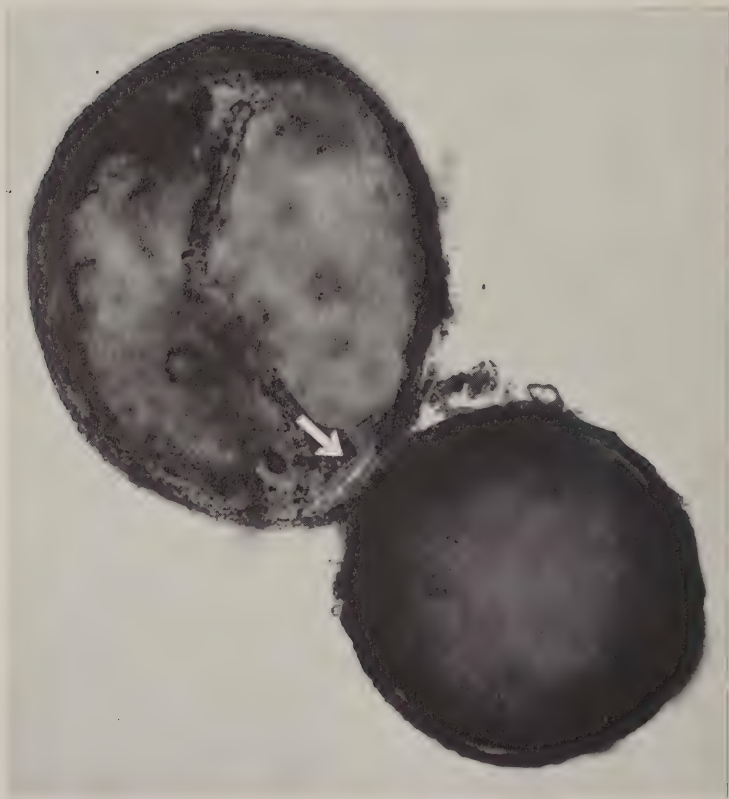


Fig. 2. Spore in lactophenol showing funnel shaped connection from spore to vesicle with thickened plug, X 320.

at first, becoming dull orange to brown, 69-183 (-225) X 69-164 μm diam., subglobose or ellipsoid. Spore enclosed by hyaline wall of vesicular stalk 2.5-10.0 μm thick; spore wall apparently one layer with vacuolated spines, 2.5-5.0 μm long, continuous except for funnel-shaped connection to the mother vesicle which is plugged with thickened wall material. Spore contents of variably sized oil globules enclosed by a thin, separable membrane. Method of spore germination undetermined. Mycorrhiza formation unknown. Vesicle and vesicular wall around spore stain blue with .05% trypan blue in lactophenol. No reaction in Melzer's reagent.

DISTRIBUTION AND HABITAT: *E. infrequens* was originally reported from New Zealand by Hall (1977). We observed it from two celery fields in the central California coast area and as a contaminant in a pot culture of *Glomus mosseae* (Nicol. & Gerd.) Gerdemann & Trappe from Oregon State University. C. Walker at Iowa State University (personal communication) found *E. infrequens* in soil under poplar trees (*Populus* sp. L.) and from soils cropped with soybean and corn in Iowa, Illinois, and Wisconsin.

MYCORRHIZAL ASSOCIATIONS: We have failed to establish mycorrhizae in pot culture using several different hosts. In other tests, trap tubes similar to those used by Ames and Linderman (1977) were inoculated with surface-sterilized spores and planted with strawberry for mycorrhiza establishment. *Glomus mosseae* and *Gigaspora margarita* Becker & Hall readily formed mycorrhizae under these conditions but *E. infrequens* did not.

COLLECTIONS EXAMINED: TYPE: NEW ZEALAND, Leith Saddle, Hall #437. PARATYPES: NEW ZEALAND, Long Bush, Hall #1, House Road, Akatore Forrest, Hall #130. Type and paratype specimens are deposited with the Herbarium, Plant Diseases Division, Dept. of Scientific and Industrial Research (DSIR), Auckland, New Zealand. Our collections are deposited in the herbaria of Oregon State University (OSC), Corvallis, Oregon 97331, and DSIR, Auckland, New Zealand. CALIFORNIA, Ventura Co., 13 km east of Oxnard and 3 km southwest of Camarillo, adjacent to U.S. Highway 34, September, 1977, Ames #03 (OSC). OREGON, Oregon State University, Corvallis, leg. B.A. Daniels, as a contaminant from pot culture of *Glomus mosseae* (Nicol. & Gerd.) Gerdemann & Trappe, Ames #04 (OSC, DSIR).

Details of the life cycle of *E. infrequens* are yet to be learned. Cotton, strawberry, celery, alfalfa, and su-

dan grass did not form VA mycorrhizae four months after inoculation with up to 70 spores of this fungus. Strawberry plants in small trap tubes dually inoculated with *E. infrequens* and either *Gigaspora margarita* or *Glomus mosseae* became mycorrhizal with infections typical of *G. margarita* or *G. mosseae* only. No parasitic activity by *E. infrequens* was observed on spores of *G. margarita*, *G. mosseae*, or on strawberry roots. *E. infrequens* may be an obligate parasite on other fungi. Spores did not germinate on water agar or potato dextrose agar after two weeks at room temperature.

Because we could not demonstrate saprophytic growth and because of the strong resemblance to *Acaulospora* spp., we feel that *E. infrequens* belongs in the Endogonaceae. The fact that mycorrhiza formation was not demonstrated by us does not present a conflict since this is apparently true for some species of *Endogone* and *Glomus* (Gerdemann & Trappe, 1974).

The authors wish to thank Dr. Charles E. Murgia for the Latin descriptions included in this article and for his assistance in choosing the Greek term for the genus.

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TYPE STUDIES: SOME CORTINARIUS AND TRICHOLOMA
SPECIES DESCRIBED BY CHARLES HORTON PECK

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SUMMARY

Type studies are presented for the following species originally described by C.H. Peck: *Cortinarius muscigenus*, *C. submarginalis*, *Tricholoma odorum*, *T. subacutum*, *T. subsejunctum*, *T. terriferum* and *T. transmutans*.

INTRODUCTION

For decades fungal taxonomists have struggled with the names of taxa published by early mycologists who did not designate type collections or cite collections in their original descriptions, and who often did not retain herbarium specimens. These names have been a source of continuous controversy and confusion and have made it difficult or impossible to establish a sound taxonomy for several groups of fleshy fungi.

In recent years a number of North American and European mycologists have actively supported the designation of special type collections (variously referred to as 'representative specimens', 'special neotypes' and 'fixotypes') for the infrageneric taxa of fleshy fungi described by E.M. Fries and other 19th- and early 20th-century mycologists. For these taxa it has been suggested that the 'designated type collection' be made in the area where the original material was gathered and that the macroscopic and microscopic characteristics be thoroughly described and agree in every detail with the protologue of the original author of the taxon. This proposal was part

of a paper presented by A.H. Smith (1977) at the Herbette Symposium on 'Species Concepts in Hymenomycetes' held at the University of Lausanne, Switzerland, August 16-20, 1976. An interesting discussion is appended to the above paper and should be read by all interested in fungal taxonomy. The selection of 'designated type collections' will require a number of years, yet, it seems to be the best way to stabilize the names of these taxa.

In addition to the above problem there are others concerning type collections that require close attention. Many of these apply to taxa described in North America. A major problem is the lack of published, thorough, modern descriptions of a number of the taxa originally described by C.H. Peck, W.A. Murrill and other early North American mycologists. Jenkins (1974, 1977, 1978a, 1978b) found this to be the case with most of the *Amanita* species described by North American workers. Type studies done previously, for example, those of Singer (1942) and Hesler (1958), while acceptable in their day are inadequate for modern taxonomic studies. Taxonomists specializing in specific taxa should make an effort to publish thorough type studies on members of their group, preferably with illustrations of important taxonomic characteristics. For routine studies mycologists could refer to these type studies rather than sending for the type collection. This practice would cut down on the damage to type collections resulting from excessive handling.

As is the case with certain taxa in the present study and in previous studies by Ammirati (1975), Jenkins (1978a) and others, collections cited in original descriptions are, in some instances, heterogeneous and require the designation of a lectotype. There are other instances where the selection of a lectotype is required, as for example, when the original author cited two or more collections but did not designate a holotype.

In instances where only one collection was cited by the original author it is usually accepted as the holotype as long as it can be clearly established that the collection was the one upon which the original description was based. This procedure is generally no problem but as Jenkins (1978a) found, the citation in the original description and the information with the herbarium specimens do not always completely agree, making it difficult to determine if the collection at hand should be

accepted as the holotype.

In those instances where authors did not cite collections in their original description or when all of the original material and its duplicates are lost, or destroyed, the designation of a neotype is required. Often collections have been destroyed or damaged by insects. Damaged collections should be carefully studied to determine whether they are still acceptable as type collections since, in some instances, important characteristics may have been lost. When type studies are made, the number of specimens and their condition should be noted so that later workers can have some idea of what the type collection is like.

As 'designated type collections' are established for the names of taxa published by 19th- and early 20th-century mycologists (those who did not cite collections or retain herbarium specimens) the type studies discussed above will become increasingly important. They are needed to establish species concepts and relationships, to determine synonymy and they are essential for the development of a world-wide system of taxonomy for fleshy fungi.

With these ideas in mind the authors have begun a study of the taxa of *Cortinarius* and *Tricholoma* described by Charles Horton Peck. Type studies of taxa described by W.A. Murrill, G.F. Atkinson and other North American mycologists will also be published. The main reasons for these studies are to confirm the existence of or establish a type collection for each taxon and thoroughly document the features of the type collection. It is not necessarily our intent to accept or reject these taxa since in many instances further study is required to clarify concepts.

Because of the large number of new taxa (in *Cortinarius* and *Tricholoma*) described by C.H. Peck it will take several years and a series of papers to complete the type studies. This is the first in the series of these papers.

Below we have provided the original description of each taxon without modification except for conversion of certain measurements to current usage and reorganization of the descriptions to parallel the format used elsewhere. This is followed by a description of the microscopic

characteristics of the type collection. Descriptions are from sections and squash mounts studied in 3% KOH (aqueous solution) or Melzer's reagent. All colors of spores and hyphae are from material mounted in KOH. In some instances tissues could not be adequately revived making it difficult or impossible to evaluate certain features of the specimens clearly. These instances are indicated in the description or discussion. Microscopic descriptions of *Cortinarii* were prepared by the senior author and those of *Tricholomas* by the junior author.

TYPE STUDIES

CORTINARIUS MUSCIGENUS Peck, Rep. N.Y. State Mus. 41:60. 1888.

Holotype: Wittenberg Mt., Catskills, September 1887, Leg. C.H. Peck (NYS).

Fig. 1

PILEUS 37.5-62.5 mm broad, at first ovate then convex or concave from the recurving of the margin, subumbonate, glabrous, viscose with a separable pellicle, tawny-orange and widely striate on the margin when moist, tawny and shiny when dry; flesh dingy white, tinged with yellow. LAMELLAE broad, ventricose, adnate, with a broad shallow emargination, somewhat rugose on the sides, yellowish becoming cinnamon. STIPE 75-100 mm long, 6.3-8.4 mm thick, subequal, viscid, even, silky, solid, white or whitish. SPORES .0005 to .0006 in long, .0003 to .00036 broad.

Mossy ground under balsam trees. Wittenberg Mountain. September.

Closely related to *C. collinitus* from which it is separated by its more highly colored pileus, striate margin, and even, not diffracted-squamose, stem.

Microscopic description

SPORES (12.1-) 14.6-18.6 (-20.4) X (7.0-) 7.7-10.6 (-11.7) μ m, in profile view elliptical to narrowly amygdaliform or amygdaliform, somewhat to strongly inequilateral with a tendency to be somewhat flattened in the suprahilar

region, in face view mostly elliptical to broadly elliptical or somewhat ovate, distal end + snout-like in some spores, rugulose to verruculose, ornamentation not particularly coarse, single spores yellow-brown with dark brown ornamentation. BASIDIA 4-spored, 32.9-41.6 X 10.2-16.1 μm , clavate to broadly clavate, hyaline with + refractive hyaline granules or containing pale yellow to golden yellow or somewhat brownish yellow pigment, walls thin and hyaline or dark brownish and slightly thickened, sterigmata well developed. PLEUROCYSTIDIA and CHEILOCYSTIDIA absent; lamellar edges appear to be composed of basidia and basidioles (tissue only revives moderately well). SUBHYMENIAL HYPHAE compactly interwoven, + cylindrical (revives poorly), hyaline or pigmented as basidia, walls thin or slightly thickened and blackish brown. TRAMAL HYPHAE OF LAMELLAE subparallel and + interwoven, cylindrical to inflated, mostly 3.7-29.2 μm wide, hyaline or containing yellowish to golden yellow or brownish golden yellow pigment, walls thin and hyaline or slightly thickened and blackish brown. CUTICULAR HYPHAE OF PILEUS + interwoven and compacted to somewhat loosely arranged, + radially oriented, matrix poorly defined in KOH but distinct in Melzer's reagent, mostly 2.2-5.8 μm wide, cylindrical, hyaline, slightly yellowish or containing yellowish pigment, walls thin to slightly thickened, hyaline to yellowish or brownish and + refractive; no pilocystidia present. TRAMAL HYPHAE OF PILEUS + interwoven, + radially oriented especially above, cylindrical to inflated, mostly 4.4-30 μm wide; upper trama (zone adjacent to cuticle) mainly composed of golden yellow to brownish golden yellow hyphae, frequently with dark incrustations; below, the trama mainly composed of hyaline to somewhat yellowish hyphae, with scattered golden yellow hyphae. CORTICAL HYPHAE OF STIPE longitudinally arranged (somewhat irregularly arranged, narrow hyphae in places on surface), subparallel to somewhat interwoven, cylindrical to + inflated, 4.0-25.6 μm wide, hyaline to slightly yellowish or dull yellowish, golden yellow, brownish yellow or brownish orange, the pigmented hyphae + refractive, some hyphae containing refractive, hyaline granules, thin-walled; hymenium decurrent on stipe apex, no caulocystidia seen. CORTICAL HYPHAE cylindrical, 2.2-6.0 μm wide, hyaline, walls thin and at times somewhat indistinct and refractive. OLEIFEROUS HYPHAE refractive, + hyaline, seen only in stipe cortex, note presence of pigmented hyphae, especially in stipe cortex, which are somewhat similar to oleiferous hyphae. CLAMP CONNECTIONS

of the normal type, present throughout the basidiocarp but difficult to see in the hymenium and lamellar trama (tissue revives poorly).

OBSERVATIONS: The information with the collection and the citation in the original description are in very close agreement. The collection contains needles and other debris of *Abies*; Peck stated that the collection was made in mossy ground under balsam trees. There is no doubt that this is the collection studied by C.H. Peck when he wrote the original description, and it is here accepted as the holotype collection.

There are 16-18 basidiocarps in the collection, including both young and mature specimens. Some are broken, and there is some insect damage, but in general the collection is in good condition. Some of the specimens are mounted on cards and most have been pressed. The tissue of the basidiocarps was somewhat difficult to revive, but all of the diagnostic characteristics could be seen.

C. muscigenus is in the subgenus *Myxacia*. It is one of several species that have equal to subequal, more or less cylindrical stipes and regularly produce clamp connections throughout the basidiocarp. *C. muscigenus* is distinguished by its very large spores (14.5-18.5 X 7.5-10.5 μ m), tawny orange to tawny pilei and the absence of lilac or violet colours in the flesh, stipe surface and lamellae.

The relationship of *C. muscigenus* to other *Myxacia* is still unclear. Peck in his original discussion suggested a relationship with *C. collinitus* (Fries) S.F. Gray. A relationship to *C. mucosus* (Bull ex. Fries) Kickx also seems possible. However, without type collections for these species it is impossible to be sure of their concepts and consequently their relationship to *C. muscigenus*.

Peck described the lamellae as "yellowish becoming cinnamon" indicating that the young lamellae were yellowish and the mature lamellae cinnamon. This type of colour change is common in *Cortinarius*. It is somewhat difficult to be sure of what Peck meant by yellowish. Field studies to date have not revealed any species in this group of *Myxacia* with truly yellow lamellae. It is likely

that the young lamellae were tinted yellow to cream color or slightly cinnamon.

CORTINARIUS SUBMARGINALIS Peck, Bull. N.Y. State Mus. 54: 950-951. Plt. L., Figs. 6-10. 1902.

Lectotype (des. mihi): Bolton, Warren Co., August 1901, Leg. C.H. Peck, *Myxarium* (NYS).

Fig. 2

PILEUS 5-10 cm broad, fleshy, firm, convex becoming nearly plane, or concave by the elevation of the margin, viscid when moist, yellowish brown, generally a little paler on the rather definite and commonly fibrillose margin; flesh whitish. LAMELLAE thin, close, adnate, creamy yellow when young, soon cinnamon. STIPE rather long, 7.5-15 cm long, 8.4-12.6 mm thick, equal or slightly thickened at the base, solid, silky fibrillose, slightly viscid, whitish or pallid. SPORES subelliptic, .0004-.0005 of an inch long, .00002-.00024 broad.

Low moist places in woods. Bolton, August.

The margin of the pileus is generally paler than the rest and separated from it by a definite line. It is from 6.3-12.6 mm broad and is sometimes curved upward and conspicuously fibrillose. This difference between the margin and the rest of the pileus is not clearly shown in dried specimens. This species belongs in the section *Myxarium*.

Microscopic description

SPORES 10.2-12.5 X 5.5-6.6 μ m, in profile elliptical to broadly elliptical or + amygdaliform, inequilateral, in face view elliptical to broadly elliptical or somewhat ovate, distal end rounded to somewhat snout-like, mostly verrucose, light yellow-brown to light medium brown with darker brown ornamentation. BASIDIA 4-spored, clavate to broadly clavate, 23.4-31.4 X 8.0-10.2 μ m, hyaline or containing light yellow, dull yellow or brownish yellow pigment, some with hyaline, + granular contents, thin-

walled. PLEUROCYSTIDIA and CHEILOCYSTIDIA absent; lamellae revive poorly, but there is no evidence of cystidia on the lamella edges. SUBHYMENIAL HYPHAE compactly interwoven, cylindrical, hyaline, thin-walled. TRAMAL HYPHAE OF LAMELLAE subparallel, + interwoven, cylindrical to inflated, 2.6-21.9 μ m wide, hyaline to slightly colored or yellowish, some containing yellow pigment, at times with granular contents, thin-walled, + refractive. CUTICULAR HYPHAE OF PILEUS + interwoven, + radially oriented, cylindrical, 2.9-9.5 μ m wide, + refractive, hyaline to slightly colored or commonly yellow to golden yellow, walls thin and hyaline or slightly brownish, often incrustated; no pilocystidia seen. TRAMAL HYPHAE OF PILEUS interwoven, + radially oriented above, cylindrical to inflated, 2.6-29.2 μ m wide, hyphae in upper trama (just below cuticle) sometimes hyaline to slightly colored or slightly yellowish but usually yellow to golden yellow, below, the hyphae more commonly hyaline to slightly yellowish, in upper trama often incrustated, mostly thin-walled, + refractive; tramal hyphae in general revive poorly, the pigmented zone in upper trama grades into cuticle and does not form a particularly distinct zone. CORTICAL HYPHAE OF STIPE longitudinally arranged, subparallel to + interwoven, cylindrical to + inflated, 3.3-21.9 μ m wide, surface hyphae are in general narrower than those just beneath surface, occasional groups of narrow, cylindrical hyphae scattered over surface near apex (perhaps part of cortina), hyaline to slightly colored or slightly yellowish; no caulocystidia seen. CORTICAL HYPHAE absent (no specimens present with cortina). OLEIFEROUS HYPHAE present, refractive, hyaline to slightly colored; there are a lot of refractive hyphae in the lamellar trama, these are much like oleiferous hyphae. CLAMP CONNECTIONS present throughout the basidiocarp, of the normal type or some on hyphae of pileus cuticle + medallion-like.

OBSERVATIONS: The information with the collection is in agreement with the citation in the original description. The collection is composed of six basidiocarps that have been pressed and are somewhat broken but in general are in good condition. The collection is heterogeneous, containing one discordant element, a pileus and attached short piece of stipe, that is unrelated to the remaining five basidiocarps. It is probably *Cortinarius gentilis* Fries or a related species. From the original protologue it is clear that Peck did not include the discordant element in his description. It has been removed from the

remainder of the collection which in turn has been designated as the lectotype.

The relationship of *C. submarginalis* to other species in *Myxaciium* is unclear. The low number of existing herbarium specimens indicates that it is an uncommon species. According to Peck's original description it is a fleshy species with a yellowish brown pileus, creamy yellow young lamellae and a whitish to pallid stipe. These characteristics, in combination with the smaller spore size ($10.2-12.5 \times 5.5-6.6 \mu\text{m}$), make it distinct.

TRICHOLOMA ODORUM Peck, Torrey Bot. Club Bull. 25(6): 321. 1898.

Holotype: Tacoma (Takoma) Park, D.C., 1895,
Mrs. E.M. Williams, (NYS).

Fig. 7

PILEUS 25-50 mm broad, fleshy, convex, becoming nearly plane or slightly depressed, subumbonate; surface glabrous, shining when young, soft like kid, yellowish or pale tan; context yellow, odor strong, jessamine-like, taste at first nutty, then farinaceous. LAMELLAE broad, thick, rounded behind, adnexed, easily separating from the stem, white or tinged with pink. STIPE 50-75 mm long, 6-10 mm thick, equal, sometimes slightly bulbous; surface silky fibrillose but pruinose at the apex, colored like pileus but pale yellow toward the base and white at the apex. SPORES $7.5-10 \times 5-6 \mu\text{m}$, elliptical.

Microscopic description

SPORES $10.5-11.4 \times 5.7-6.7 \mu\text{m}$ (from stipe apex), amygdaliform to subfusiform in profile, broadly fusiform in face view, smooth, thin-walled, hyaline, inamyloid. BASIDIA $33-37 \times 7.6-8.6 \mu\text{m}$, 4-spored, clavate, hyaline, inamyloid. HYMENIAL CYSTIDIA and CAULOCYSTIDIA not seen. TRAMAL HYPHAE OF LAMELLAE $3.8-9.6 \mu\text{m}$ broad, parallel, undulating, cylindrical to slightly inflated, hyaline, inamyloid. CUTICULAR HYPHAE OF PILEUS $2.9-3.8 \mu\text{m}$ broad, radially appressed to slightly interwoven, cylindrical, smooth, thin-walled, hyaline to light cinnamon tan, inamyloid. TRAMAL HYPHAE OF PILEUS $4.8-11.4 \mu\text{m}$ broad, radially arranged,

cylindrical to slightly inflated, hyaline, inamyloid. SURFACE HYPHAE OF STIPE 2.9-4.8 μm broad, longitudinally appressed, cylindrical, smooth, thin-walled, hyaline to light yellow, inamyloid. TRAMAL HYPHAE OF STIPE 3.8-12 μm broad, parallel, compacted, cylindrical to slightly inflated, hyaline, inamyloid. HYPHAE AT STIPE BASE 2.9-4.8 μm broad, cylindrical, smooth, thin-walled, hyaline, inamyloid. OLEIFEROUS HYPHAE not seen. CLAMP CONNECTIONS present at base of basidia.

OBSERVATIONS: The type collection consists of 3 fruiting bodies, all with broken stipes. The collection is homogeneous. The information with the collection agrees with that given in the original description. It is concluded that this collection is the one cited by Peck and can be accepted as the holotype.

Peck states that *T. odorum* is remarkable for its peculiar and strong odor, which resembles that of jessamine blossoms. The odor and large spores link it to *Tricholoma sulphureum* (Fr.) Staude. A number of European varieties of *T. sulphureum* are recognized (Bon, 1974), but none fit the fungus described by Peck.

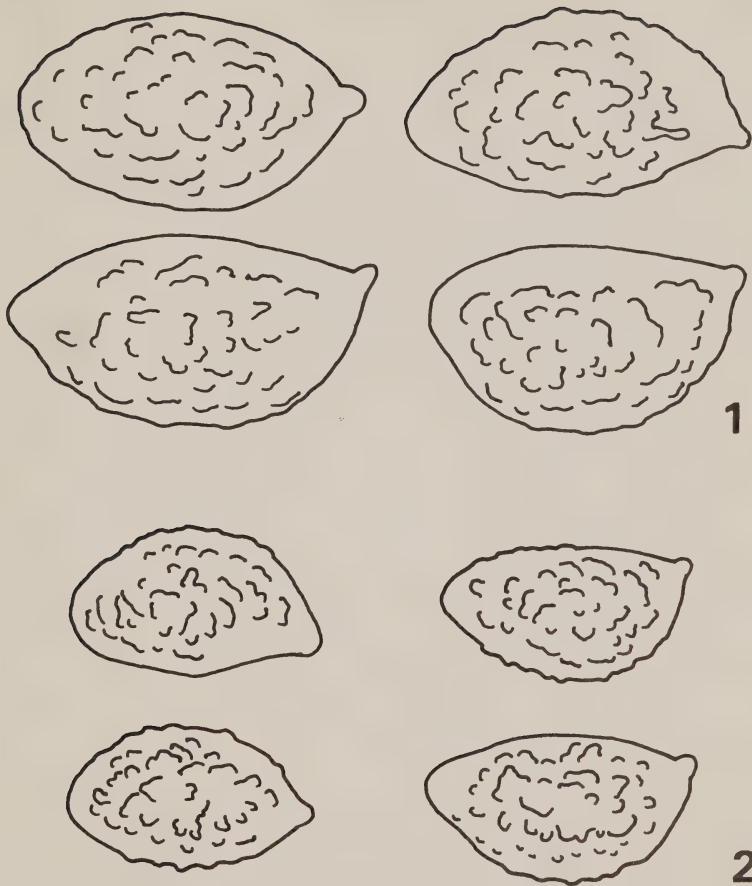
I have collected this species in Michigan and Ontario under hardwoods. The carpophores are almost entirely yellow when young, but the pilei and lamellae fade to buff or tan in age.

TRICHOLOMA SUBACUTUM Peck, Rep. N.Y. St. Mus. 42: 16-17. Plt. 1, Figs. 1-5. 1889.

Holotype: Woods and groves, North Elba, September, (NYS).

Fig. 4

PILEUS 38-76 mm broad, ovate or broadly conical at first, then convex and subacutely umbonate; surface dry, silky and obscurely virgate with minute, innate fibrils, whitish and tinged with smoky-brown or bluish-gray, darker on the umbo; context white, taste acrid or peppery. LAMELLAE slightly adnexed, white, rather close. STIPE 50-100 mm long, 6-13 mm thick, equal; surface silky-fibrillose, white; context stuffed or hollow. SPORES .00025-.0003 in long, .0002 to .00025 broad (6.4-7.6 X 5.1-6.4 μm), broadly



FIGS. 1-2 Basidiospores (x2500). 1. *Cortinarius muscigenus*. 2. *Cortinarius submarginalis*.

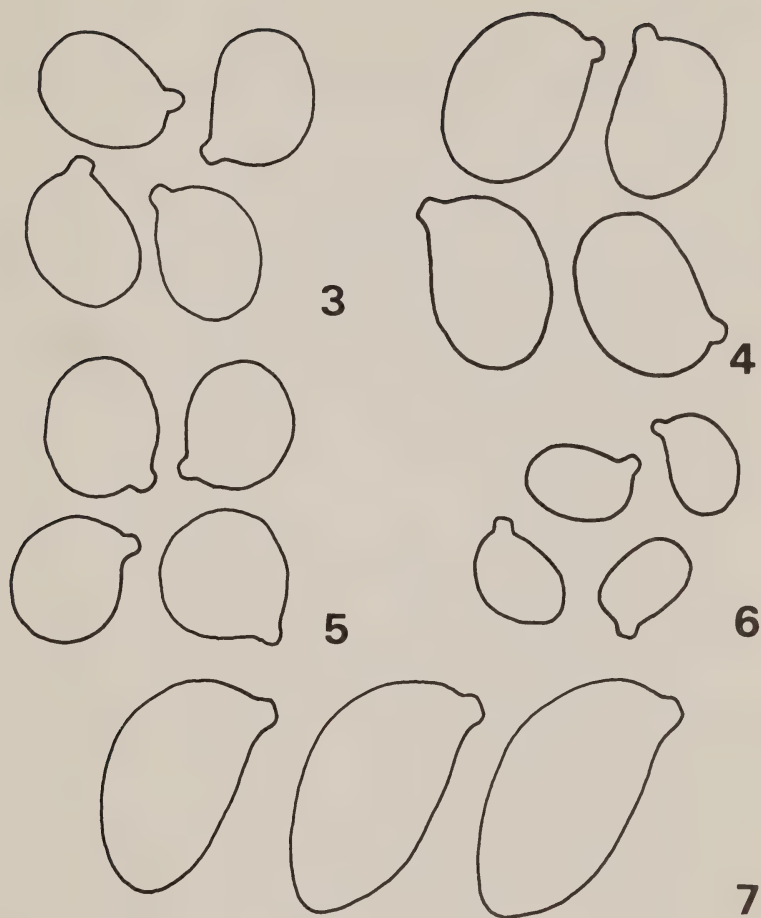
elliptical or subglobose.

Microscopic description

SPORES 7.6-8.6 X + 5.7 μ m (from stipe apex), broadly elliptical in profile and face view, smooth, thin-walled, hyaline, inamyloid. BASIDIA 34-38 X 7.6-9.5 μ m, 4-spored, occasionally 2-spored or mucronate (single sterigma), hyaline, inamyloid. CHEILOCYSTIDIA 24-31 X 11-14 μ m, clavate to broadly clavate (mostly collapsed), smooth, thin-walled, hyaline, inamyloid. PLEUROCYSTIDIA absent. CAULOCYSTIDIA present as recurved hyphal end cells at stipe apex or scattered elsewhere, 23-29 X 5.7-7.6 μ m, cylindrical or clavate, smooth, thin-walled, hyaline, inamyloid. TRAMAL HYPHAE OF LAMELLAE 3.8-14 μ m broad, parallel, cylindrical to slightly inflated, hyaline, inamyloid. HYPHAE OF SUBHYMENIUM 2.9-3.8 μ m broad, hyaline, inamyloid. CUTICULAR HYPHAE OF PILEUS 2.9-5.7 μ m broad, radially appressed to slightly interwoven, cylindrical, smooth, thin-walled, hyaline to light yellow, inamyloid. TRAMAL HYPHAE OF PILEUS 3.8-14 μ m broad, radially arranged and cylindrical near the cuticle, interwoven and cylindrical to interwoven elsewhere, hyaline, inamyloid. SURFACE HYPHAE OF STIPE 2.9-4.8 μ m broad, longitudinally appressed, cylindrical, smooth, thin-walled, hyaline, inamyloid. TRAMAL HYPHAE OF STIPE 4.8-14 μ m broad, parallel, compacted, hyaline, inamyloid. HYPHAE AT STIPE BASE 2.9-5.7 μ m broad, hyaline, inamyloid. OLEIFEROUS HYPHAE present, hyaline, inamyloid. CLAMP CONNECTIONS absent.

OBSERVATIONS: The type collection consists of about 10 fruiting bodies, most are broken into several pieces. The collection is homogeneous and the information on the label of the herbarium box agrees with that given in the original description. It is concluded that this collection is the one cited by Peck and thus can be accepted as the type.

Peck states that *Tricholoma subacutum* is "too closely related to *Tricholoma virgatum*, but it is separable by its prominent subacute umbo, paler pileus, hollow stem and hot or peppery taste". Since there is no type for *T. virgatum* (Fr.) Kummer, it is nearly impossible at this time to ascertain whether *T. subacutum* is a distinct species.



FIGS. 3-7 Basidiospores (x2500). 3. *Tricholoma transmutans*. 4. *Tricholoma subacutum*. 5. *Tricholoma sejunctum*. 6. *Tricholoma terriferum*. 7. *Tricholoma odorum*.

TRICHOLOMA SUBSEJUNCTUM Peck, Rep. N.Y. St. Mus. 157: 53.
Plt. 24, Figs. 1-5. 1912.

Holotype: Under evergreen and deciduous trees,
Lewis Co., September 21, 1911, (NYS).

Fig. 5

PILEUS 25-70 mm broad, fleshy, conic or convex; margin often wavy and lobed; surface slightly viscid when moist, virgate or reticulate with blackish brown fibrils, blackish brown, often pale yellow or greenish yellow on the margin; context white, taste farinaceous. LAMELLAE adnexed, thin, rounded behind, white, sometimes tinged yellow anteriorly, close. STIPE 30-50 mm long, 6-12 mm thick, stout, nearly equal, white, sometimes tinged yellow; context solid. SPORES minute, 5-6 X 4-5 μ m.

Microscopic description

SPORES 5.7-6.7 x 4.8-5.7 μ m (from stipe apex), broadly elliptical to subglobose in profile and face view, smooth, thin-walled, hyaline, inamyloid. BASIDIA 30-38 x 7.6-9.8 μ m, 4-spored, clavate, hyaline, inamyloid. HYMENIAL CYSTIDIA absent. CAULOCYSTIDIA present as recurved hyphal end-cells at stipe apex, 19-26 x + 3.8 (-7.6) μ m, cylindrical or clavate, smooth, thin-walled, single or in pyramidal clusters, hyaline, inamyloid. TRAMAL HYPHAE OF LAMELLAE 3.8-14 μ m broad, parallel, cylindrical to slightly inflated, hyaline, inamyloid. HYPHAE OF SUBHYMENIUM 1.9-2.9 μ m broad, hyaline, inamyloid. CUTICULAR HYPHAE OF PILEUS 2.9-5.7 μ m broad, loosely interwoven to nearly erect, embedded in a gelatinous matrix, cylindrical, smooth or slightly roughened, thin-walled, hyaline to dull yellowish brown, inamyloid. TRAMAL HYPHAE OF PILEUS 3.8-16 μ m broad, radially arranged to interwoven, cylindrical to inflated, hyaline, inamyloid. SURFACE HYPHAE OF STIPE 2.9-4.8 μ m broad, longitudinally appressed, cylindrical, smooth, thin-walled, hyaline, inamyloid. TRAMAL HYPHAE OF STIPE 3.8-14 μ m broad, parallel, compacted, cylindrical to inflated, hyaline, inamyloid. HYPHAE AT STIPE BASE 2.8-5.7 μ m broad, cylindrical, thin-walled, hyaline, inamyloid. OLEIFEROUS HYPHAE present, light yellow, inamyloid. CLAMP CONNECTIONS absent.

OBSERVATIONS: The type collection consists of 4 or 5 pressed fruiting bodies in fair condition. The

collection is homogeneous and the information with the collection agrees with that given in the original description. It is concluded that this collection is the one cited by Peck and can be accepted as the holotype.

Tricholoma subsejunctum is closely related to *Tricholoma sejunctum* Quel. but differs in having a darker (blackish brown) pileus. The illustration with the original publication shows the pileus to be streaked with black fibrils giving the pileus a blackish color; the extreme edge is tinted yellow. This extremely dark color, assuming it is accurately reproduced, easily distinguishes *T. subsejunctum* from *T. sejunctum*. The latter may have a dark brownish disc or some fibrils may be nearly black, but the pileus is never as black as that of *T. subsejunctum*. Microscopically, the two are almost identical. Additional collections of *T. subsejunctum* are needed to establish a clear concept of this species and its relationship to *T. sejunctum*.

Peck reports this species as being edible.

TRICHOLOMA TERRIFERUM Peck, Rept. N.Y. St. Mus. 41: 60. 1888.

Holotype: Woods, Catskill Mountains, September (NYS).

Fig. 6

PILEUS 76-102 mm broad, convex or nearly plane, irregular; margin often wavy; surface viscid, glabrous, pale alutaceous, generally soiled with adhering particles of earth carried up in its growth; context white and with no decided odor. LAMELLAE slightly adnexed, white, not spotted or changeable. STIPE 25-38 mm long, 13-17 mm thick, short, equal; surface floccose or squamulose at the apex, white; context solid. SPORES minute, .00012 in (3 μ m) long, subglobose.

Microscopic description

SPORES + 4.8 X 2.9-3.8 μ m (from stipe apex), elliptical in profile and face view, smooth, thin-walled, hyaline, inamyloid, uniguttulate. BASIDIA 19-25 X 4.8-5.7 μ m, 4-spored, clavate, hyaline, inamyloid. HYMENIAL

CYSTIDIA absent. CAULOCYSTIDIA present on stipe apex, formed from recurved end-cells or arising from intercalary cells, 24-33 X 3.8-6.7 μ m, cylindrical, stragulate, clavate, some with cross walls, smooth, thin-walled, single or in fascicles or pyramidal clusters, hyaline, inamyloid. TRAMAL HYPHAE OF LAMELLAE 3.8-14 μ m broad, parallel, cylindrical to slightly inflated, hyaline, inamyloid. HYPHAE OF SUBHYMENIUM + 2.9 μ m broad, hyaline, inamyloid. CUTICULAR HYPHAE OF PILEUS 1.9-4.8 μ m broad, embedded in a gelatinous matrix, loosely interwoven to nearly erect, smooth, thin-walled, hyaline to light yellowish brown, inamyloid. TRAMAL HYPHAE OF PILEUS 3.8-12 μ m broad, radially arranged to interwoven, cylindrical to slightly inflated, hyaline, inamyloid. SURFACE HYPHAE OF STIPE 2.4-4.8 μ m longitudinally appressed or sometimes loosely interwoven in spots, cylindrical, smooth, thin-walled, hyaline, inamyloid. TRAMAL HYPHAE OF STIPE 3.8-9.5 μ m broad, parallel, compacted, cylindrical, hyaline, inamyloid. HYPHAE AT STIPE BASE 2.9-6.7 μ m broad, cylindrical, smooth, thin-walled, hyaline, inamyloid. OLEIFEROUS HYPHAE present, light yellow, inamyloid. CLAMP CONNECTIONS absent.

OBSERVATIONS: The type collection consists of 4 fruiting bodies that are in good condition but are pressed and flattened. The collection is homogeneous and the information on the label of the herbarium box agrees with that given in the original description. It is concluded that this collection is the one cited by Peck and can be accepted as the type.

Tricholoma terrifeum is related to those species of *Tricholoma* with brown, viscid pilei, a group that is in need of critical study in North America. Its most distinguishing features appear to be its pale, alutaceous pileus color, lamellae that do not discolor and small spores (4.8 x 2.9-3.8 μ m). Collections from the type locality with thorough notes are needed to establish a sound concept for this species.

AGARICUS (TRICHOLOMA) TRANSMUTANS Peck, Rep. N.Y. St. Mus. 29: 38. 1878.

≡ TRICHOLOMA TRANSMUTANS (Pk.) Sacc., Syll. Fung. 5: 91. 1887.

Fig. 3

Holotype: ground in woods, Sandlake, August (NYS).

PILEUS 50-76 mm broad, convex; surface smooth, very viscid or glutinous and alutaceous when moist, becoming brownish or reddish when dry. LAMELLAE narrow, whitish or pale yellow, becoming red-spotted, often branching, close. STIPE 76-100 mm long, 6-10 mm thick, equal or tapering upwards; surface smooth, whitish, often reddish stained; context stuffed or hollow. SPORES .0002 in (5 μ m) in diameter, subglobose.

Microscopic description

SPORES 6.7-6.7 X + 4.8 μ m (from stipe apex), broadly elliptical in profile and face view, smooth, thin-walled, hyaline, inamyloid, uniguttulate. BASIDIA 24-29 X 5.7-7.6 μ m, 4- or occasionally 2-spored, clavate or irregularly clavate, hyaline or reddish brown (particularly at gill edge), inamyloid. HYMENIAL CYSTIDIA absent but often large basidiole-like cells present (29-36 X 5.7-8.6 μ m) on gill edge. CAULOCYSTIDIA recurved hyphal end-cells at stipe apex, 24-33 x 3.8-7.6 μ m, cylindrical or clavate, smooth, thin-walled, single or in fascicles, hyaline, inamyloid. TRAMAL HYPHAE OF LAMELLAE 3.8-14 μ m broad, parallel, undulating, cylindrical to slightly inflated, hyaline or reddish brown in spots, inamyloid. SUBHYMENIAL HYPHAE + 3.8 μ m broad, hyaline, inamyloid. CUTICULAR HYPHAE OF PILEUS 2.9-5.7 μ m broad, embedded in a gelatinous matrix, interwoven, cylindrical, smooth, thin-walled or with hyaline incrustations on the outer surface, hyaline to light reddish brown, inamyloid. TRAMAL HYPHAE OF PILEUS 3.8-14 μ m broad, radially arranged and narrowly cylindrical near the cuticle, interwoven and cylindrical to inflated elsewhere, hyaline, inamyloid. SURFACE HYPHAE OF STIPE 2.8-4.8 μ m broad, longitudinally appressed, cylindrical, smooth, thin-walled, hyaline to light tan, inamyloid. TRAMAL HYPHAE OF STIPE 3.8-11.4 μ m broad, parallel, compacted, cylindrical to slightly inflated, hyaline, inamyloid. HYPHAE AT STIPE BASE 2.9-4.8 μ m broad, cylindrical, smooth, thin-walled, hyaline, inamyloid. OLEIFEROUS HYPHAE present, light brown, inamyloid. CLAMP CONNECTIONS absent.

OBSERVATIONS: The type collection consists of about 12 pressed fruiting bodies. Most are in good condition, but several are broken. The collection is homogeneous and the information with the collection agrees with that given in the original description. It is concluded that this collection is the one cited by Peck and can be accepted as the holotype.

Peck states that this species occurs in wet weather and has a tendency to grow in circles.

Tricholoma transmutans is one of several species of *Tricholoma* with a brown, viscid pileus. Its relationship to other species is difficult to ascertain because the color of the lamellae is difficult to interpret. Peck in his original description described them as whitish or pale yellow. Illustrations in a later publication (Peck, 1896) show the lamellae as yellowish in face view but white or light buff when viewed as a group from an oblique angle. Another possibility is that the lamellae change color as they mature, but this is not suggested in Peck's original description.

Several authors (Kauffman, 1918; Singer, 1942) relate *T. transmutans* to *T. flavobrunneum* (Fr.) Staude, a species with yellow lamellae. If, in fact the lamellae are white to light buff, rather than yellow, then *T. transmutans* is probably more closely related to *T. pessundatum* (Fr.) Quel. Additional collections, preferably from the type locality, are needed to determine the correct lamellae color for *T. transmutans*. This would provide a better overall concept of the species and help to elucidate its true relationship to other *Tricholomas*.

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STUDIES ON DIMARGARITACEAE (MUCORALES) II. A NEW DISPIRA PARASITIC ON ASCOMYCETOUS HOSTS

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SUMMARY

Dispira implicata Misra & Lata sp. nov. isolated from dung of rodents, house lizard and excreta of birds, collected from Gorakhpur, U.P., India, is described and illustrated. It parasitizes *Chaetomium bostrychodes*, *Ascotricha* sp., and *Thielavia* sp. and is characterized by complex fertile axes which form long spiral coils. This is the second member of the Dimargaritaceae which parasitizes non-mucoralean hosts.

The genus *Dispira* van Tieghem is characterized by sporophores producing sympodially branched fertile branch-systems which form coiled or angular axes bearing sterile and fertile branches, the latter terminated by two-celled sporiferous branchlets whose cells bear distal whorls of two-spored merosporangia (Benjamin, 1959). Three species are recognized in this genus: *Dispira cornuta* van Tieghem, *D. simplex* Benjamin, and *D. parvispora* Benjamin (Benjamin, 1963). The occurrence of the first two species in India has been described in a previous communication (Misra & Gupta, 1978).

An interesting *Dispira* was first isolated in December, 1977, from mouse dung collected in Gorakhpur, India. Several isolates of the same species were later obtained from incubated dung of rat, shrew, house lizard, and excreta of birds. The fungus failed to parasitize *Cokeromyces recurvatus* Poiras but grew readily on *Chaetomium bostrychodes* Zopf on yeast extract soluble starch agar (YpSs). It also grew on *Ascotricha* sp. and *Thielavia* sp. which were tried as hosts. The fungus differs sharply from the described species of *Dispira* in the nature of its fertile axes and is described here as *Dispira implicata* sp. nov. The epithet is based on the complex nature of its fertile axes. It is the second member of the family Dimargaritaceae which parasitizes non-mucoralean hosts; the other species known to parasitize *Chaetomium* is *Dispira simplex* (Benjamin, 1961; Brunk & Barnett, 1966).

DISPIRA IMPLICATA Misra & Lata, sp. nov.

FIGS. 1,2

Coloniae *Chaetomium bostrychodem* in agaro cum extracto fermenti et amylo solubili composito (YpSs) vegetantem undecimam diem parasitantes 1 cm diametro, 4-6 cm altae, densae primo albae, seniores cinnamomeae evadentes. Hyphae vegetabiles 1.7-2.8 μ diametro. Sporophori erecti, septati, ad 6 mm alti, ex latere ramos 3-10 fertiles producentes. Rami fer-

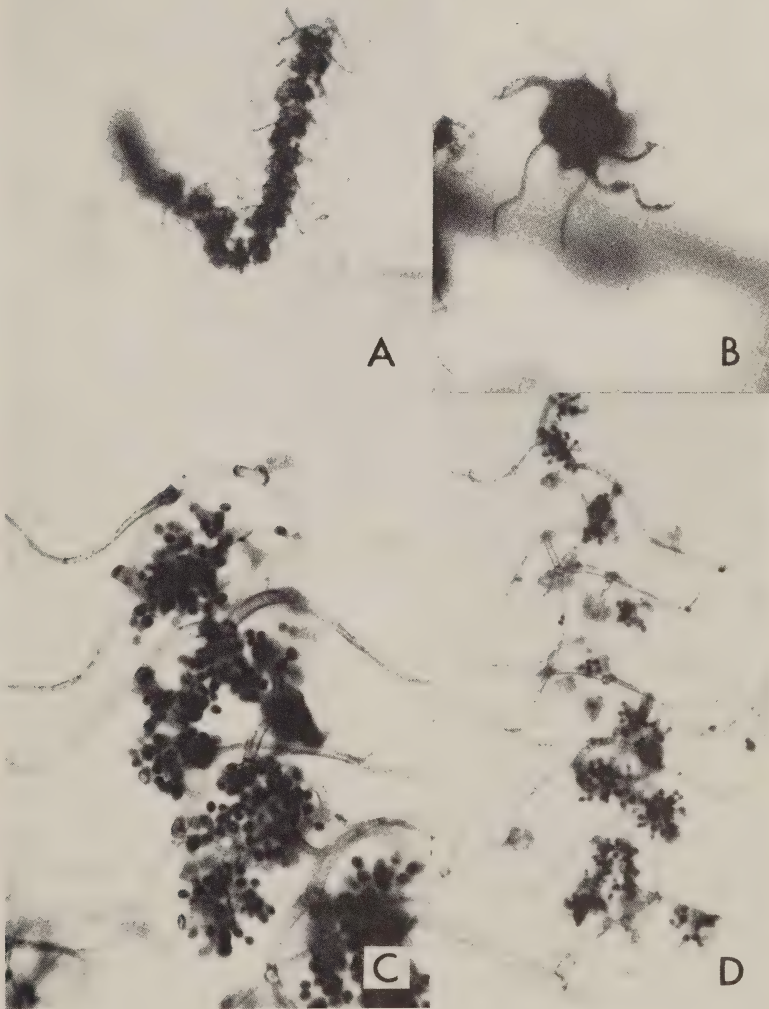


FIG. 1. *Dispira implicata*. A. Two spirally coiled fertile axes in surface view, $\times 110$. B. Fertile axis in top view, $\times 240$. Both A and B photographed from petri dish culture. C, D. Spirally coiled fertile axes. C, $\times 575$. D, $\times 260$.

tiles singuli atim, raro bini, orti, prope sub sporophori septis aliquibus, primo ex axi centrali brevi recurvato in 2-3, raro 4, ramulis spori-feris terminato et ramum lateralem solum vel par ramorum producente consistentes; unus ramus lateralis vel gemini, et nonnumquam axis centralis in ramos triplices ad quadraginta duas assiduitates fissus, unusquisque axem cochleaeformem conficiens ad omne trifurcium ramulum fertilem, ramulum sterilem, et ramulum axem producentem gignens; ramum lateralem non axem cochleaeformem efformans vulgo non post quartum trifurcium se produ-cens; trifurcia spatio paene aequali, 16-24 μ , inter se distantes. Coch-leae diametro aequae, 150-300 μ longae, 38-53 μ latae, ramis sterilibus exclusis, ad 10 gyros efficientes, plerumque 4 trifurcis inter gyrum unum inclusis, ramulis omnibus fertilibus intra cochleam positis, sterilibus tamen extra cochleam projicientibus, in superficie igitur instar centi-pedae. Ramuli steriles stricte attenuati, paulum cochleaeformes, haud vel semel septati, 28-75 (-93) μ longi, ad medium 1.1-2.3 μ lati. Ramuli fer-tilis recurvati, 17-28 μ longi ad medium 2.3-4.6 μ lati, desinentes in 2-3, raro 4 ramulos sporiferos in ordine ab gemmatione productos. Ramuli sporiferi haud a vesiculis subtendi, 9.2-13.8 $\times$ 3.4-5.7 μ , e cellulis du-babus paene aequalibus, subovoideus circulos distales merosporangiorum bi-spororum ferentes compositi; parte terminali merosporangii a gemmatione apicali orta e basali. Sporae globosae, subglobosae, ovoideae, vel non-numquam ellipsoidales, hyalinae, leves, maturae semper siccae; globosae 2.3-4.6 μ diametro, ovoideae et ellipsoidales 3.4-4.6 (-5.1) $\times$ 2.3-2.8 (-3.4) μ . Zygosporae in culturis vetustis in agri superficie efformantae in finibus projectorum lateralium hypharum vegetabilium, pallide griseo-brunneae, globosae, crasse tunicatae, foveis ellipticis depressae, cre-bre paene leves, 25-35 μ diametro, maturae globulum magnum, eccentricum refractilem includentes, 10.3-13.8 μ diametro, tunica 3.4-4.6 μ crassa.

Typus: PCM 632.

Colonies on *Chaetomium bostrychodes* on yeast extract soluble starch agar (YpSs) 1 cm in diam in 10 days at 30 C, 4-6 mm high, dense, at first white, becoming 'Cartridge Buff' (Maerz and Paul, 1950, Plate 11 B2) in 15 days and then 'Cin-namon' (Plate 12 D7) in one month. Vegetative hyphae color-less, smooth, sparsely branched, septate, 1.7-2.8 μ in diam. Sporophores erect, septate, up to 6 mm high, very light grey-ish brown, smooth-walled, bearing laterally 3-10 fertile branches. Fertile branches arising singly, rarely in pairs, immediately below some of the septa of the sporophore. Fer-tilite branch consisting at first of a short recurved central axis terminated by 2-3, rarely 4 sporiferous branchlets and giving rise to a single or a pair of lateral branches; either one or both lateral branches and sometimes the central axis becoming up to 42 times successively trichotomously branched forming spirally coiled axes bearing at each trichotomy a fertile branchlet, a sterile branchlet and a branchlet which continues the axis; the lateral branch nor forming spiral axis generally ceasing growth after fourth trichotomy; tri-chotomies almost equally spaced, about 16-24 μ apart. Spiral coils of same diam throughout, 150-300 μ long, 38-53 μ wide (excluding sterile branchlets), each consisting of up to 10 turns (gyres), with usually 4 trichotomies per turn, with all fertile branchlets contained within the spirals, with all sterile branchlets projecting towards the outside of the spiral coil and, in surface view, resembling the legs of a centipede. Sterile branchlets narrowly attenuated, slightly spirally coiled, aseptate or 1-septate, 28-75 (-93) μ long,

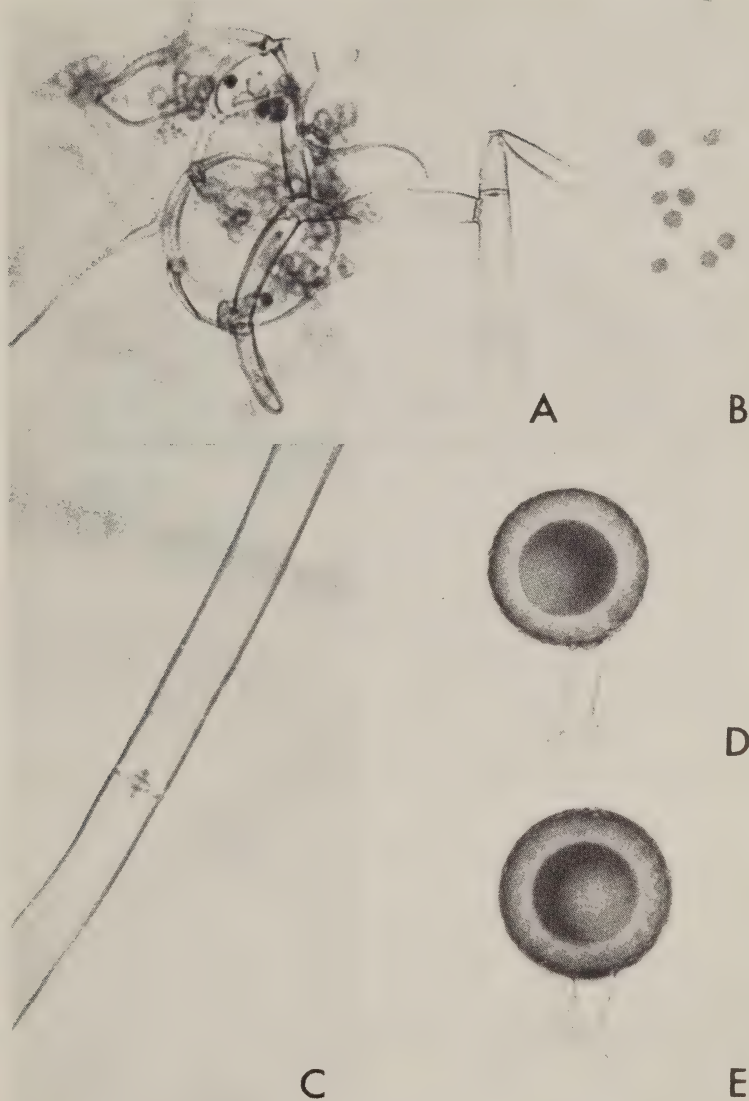


FIG. 2. *Dispira implicata*. A. Young fertile branch, $\times 700$. B. Spores, $\times 800$. C. Typical cross-wall, $\times 1000$. D, E. Zygospores. D, $\times 730$. E, $\times 800$.

1.1-2.3 μ wide near the middle, smooth. Fertile branchlets recurved, 17-28 μ long, 2.3-4.6 μ wide in the middle, terminated by 2-3 or rarely 4 sporiferous branchlets formed successively by budding. Sporiferous branchlets not subtended by vesicles, 9.2-13.8 $\times$ 3.4-5.7 μ , composed of two almost equal, slightly ovoid cells bearing distal whorls of two-spored merosporangia; the terminal part of the merosporangium developed by apical budding from the basal. Spores globose, subglobose, ovoid or occasionally ellipsoid, hyaline, smooth-walled, remaining dry at maturity; globose spores 2.3-4.6 μ in diam, ovoid or ellipsoid spores 3.4-4.6 (-5.1) $\times$ 2.3-2.8 (-3.4) μ . Zygosporangia formed on agar surface in old cultures, developed terminally on lateral outgrowths of vegetative hyphae, light greyish brown, globose, thick-walled, marked with elliptical depressions, often appearing almost smooth, 25-35 μ in diam, containing, when mature, one large, usually eccentric, refractive globule 10.3-13.8 μ in diam; wall 3.4-4.6 μ thick.

Holotype: INDIA, UTTAR PRADESH, Gorakhpur, Dewan Bazar, isolated from mouse dung, Dec. 1977, PCM 632. Living cultures will be transmitted to ATCC, NRRL, and RSA.

Other specimens examined: UTTAR PRADESH, Gorakhpur, Dewan Bazar, Dec. 1977, mouse dung, PCM 631; April 1978, lizard dung, PCM 636; April 1978, rat dung, PCM 637; June 1978, shrew dung, PCM 638; August 1978, bird excreta, PCM 639; Gorakhpur, Hirapuri Colony, Dec. 1977, shrew dung, PCM 633; Dec. 1977, shrew dung, PCM 634; March 1978, mouse dung, PCM 635.

ACKNOWLEDGMENTS

The authors thank Prof. Donald P. Rogers for translating the diagnosis into Latin. The work was supported by grant No. F.23-613/77(SR.II) from the U. G. C., India.

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APOPHYSOMYCES, A NEW GENUS OF THE MUCORALES

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SUMMARY

Apophysomyces elegans, a new genus and species of Mucorales isolated from soil is illustrated and described. It has pyriform sporangia with conspicuous, funnel-shaped or bell-shaped apophyses produced singly and terminally on unbranched sporangiophores which are generally developed laterally from aerial hyphae with a 'foot-cell'-like hyphal segment at the base, or which arise at the end of stolon-like branches with a group of rhizoids below; the wall of the sporangiophores is characteristically darkened and thickened a little below the apophysis.

A new genus is described in the Mucorales to accommodate a very interesting fungus which could not be placed in any known genus. The genus is named *Apophysomyces* on account of its very distinct and characteristic apophyses. The type and only species is described here as *Apophysomyces elegans*, the epithet meaning fine or neat. The description is based on two isolates which were obtained from soil of a mango orchard and of a grassy site, situated about 50 km apart. Both isolates appeared on soil plates prepared with Martin's peptone dextrose agar (Martin, 1950). The fungus grew well on malt extract agar, synthetic *Mucor* agar (SMA) and yeast extract soluble starch agar (YpSs) media. Normal growth and reproduction occurred at 30-40 C. Growth was very poor on Czapek's solution agar and plain agar (water agar) media. On the latter medium a different mode of formation of sporangiophores was observed.

APOPHYSOMYCES Misra, *gen. nov.*

Sporangiophora plerumque singula crescentia ex hyphis aeriis cum segmento hyphali modificato in basi, vel hypharum stoloniformium in apicibus cum rhizoideis infra, haud ramosa, apicem versus gradatim attenuata, griseo-brunnea, crassi-tunicata, pariete interne plerumque fuscato et incrassato in uno loco paulatim subapophysis. Sporangia terminalia, singula, pyriformia, multispora, cum apophysis infundibuliformiis vel campanulatis distinctis atque columellis hemisphericis; paries sporangii tenuis, levis, deliquescens, derelinquens collum aliquod. Sporangiosporae plerumque oblongae, subhyalinae, leves.

Species typica: *Apophysomyces elegans* Misra, Srivastava & Lata.

Sporangiophores generally developing singly, on rich media usually arising near the ends of aerial hyphal branches with a segment of the hyphal branch at the place of origin of

sporangiophores becoming slightly thicker-walled and light greyish brown after becoming delimited by septa, on plain agar arising at the ends of stolon-like hyphae with a group of rhizoids below, unbranched, slightly tapered towards the apex, greyish-brown, thick-walled, with the wall generally darker and thicker towards the inside at a place a little below the apophysis. Sporangia produced terminally and singly, pyriform, with conspicuous funnel-shaped or bell-shaped apophyses, multispored, with hemispherical columellae. Sporangial wall thin, deliquescent, leaving a small collar at the base of the columellae. Sporangiospores mostly oblong with rounded ends, subhyaline, thin-walled, smooth.

APOPHYSOMYCES ELEGANS Misra, Srivastava & Lata, *sp. nov.*

(FIGS. 1 & 2)

Coloniae in SMA vel agar YpSs rapide crescentes, flocculentes, primum albae, maturescentes brunneo-griseae. Hyphae aerae ramosae, hyalinae, plerumque aseptatae vel cum septis nonnullis in culturis maturis, 3.4-8.0 μ m in diam. Sporangiphora plerumque crescentia singula prope apices ramorum hyphalium aeriorum pariete uno incrassato et segmento hyphali leviter griseo-brunneo in basi, recta vel curvata, haud ramosa, crassi-tunicata, laevia, usque ad 532 μ m longa, ad basim 3.4-5.7 μ m lata, apicem versus gradatim attenuata 2.3-3.4 μ m subapophysis; pariete interne nonnumquam leniter fuscato et incrassato uno loco 4-18 μ m subapophysis. Sporangia terminalia, singula, pyriformia, multispora, distincte apophysata, columellata, 20-58 μ m diam, paries pellucidus, lenis, deliquescent, derelinquens collum aliquod. Apophyses conspicae infundibuliformes vel campanulatae, 10-46 μ m altae, 11-40 μ m diam in loco latissimo. Columella hemispherica, subhyalina usque ad pallide griseo-brunnea, 18-28 μ m diam, collare ornata. Sporangiosporae plerumque oblongae, raro subglobosae, subhyalinae, leves, 5.4-8.0 $\times$ 4.0-5.7 μ m. Zygosporae non visae.

Coloniae in agar simpliciter ex hyphis ramosis, sparsis, immersis pro parte maxima compositae, formantibus paucos stiones aeries et rhizoideos. Sporangiphora singula crescentia in apice hyphalium stoloniformium ramorum quae infra structura rhizoidea sunt ornata, erecta, levia vel apicem et basim versus incrassata; pariete sporangiophorarum interne incrassante subapophysis magis conspiciuum. Rhizoidea haud ramosa vel paucoramosa, 2.3-4.6 μ m diam.

Holotypus: PCM 597.

Colonies on synthetic *Mucor* agar and yeast extract soluble starch agar growing rapidly at 30-32 C, at first low and growing near the agar surface, soon forming flocculent aerial mycelium and filling the petri dish within 7 days of inoculation, white at first, becoming brownish grey (Maerz and Paul 1950, near Plate 15 C6) in age; reverse pale yellow. Mycelium aerial and submerged; aerial hyphae branched, hyaline, smooth, generally aseptate but with a few septa in old cultures, 3.4-8.0 μ m in diam; submerged hyphae very thin, profusely branched, colorless, aseptate, compacted. Sporangiphores formed slowly, generally arising singly, developing almost at right angles from aerial hyphal branches with a segment of the hyphal branch at the place of origin of sporangiophore generally becoming delimited by two septa and the segment then becoming slightly thicker-walled and light greyish brown; often the hyphal branch after forming a lateral sporangiophore proceeding to form a second sporangiophore and terminating the branch, or the branch continuing for some length before ceas-

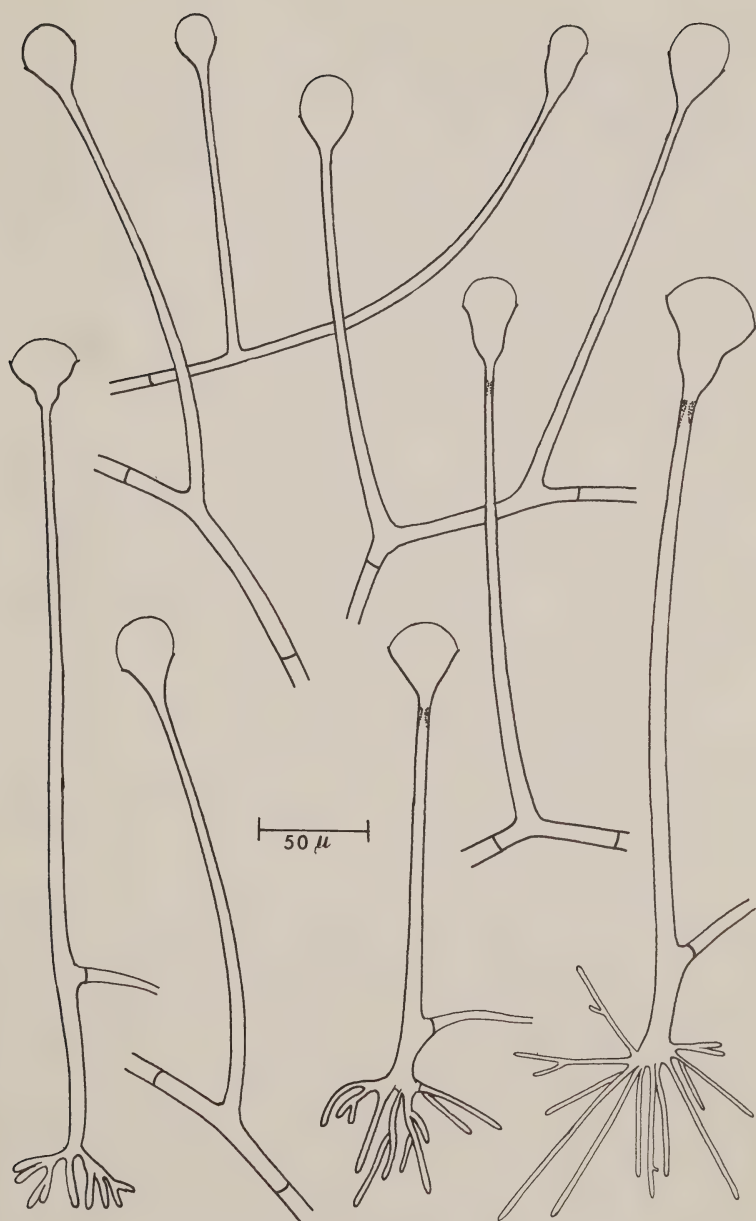


FIG. 1. *Apophysomyces elegans*. Sporangioophores.

ing growth. Sporangioophores straight or curved, slightly tapered towards the apex, unbranched, light greyish brown, often darker near the base, up to 532 μm long, 3.4-5.7 μm wide near the base, gradually tapering to 2.3-3.4 μm wide just below the apophyses; wall thick, smooth, occasionally slightly darker and thicker towards the inside at a point about 4-18 μm below the apophyses. Sporangia produced terminally and singly on the sporangioophores, pyriform, multispored, distinctly apophysate, columellate, white at first, light yellowish brown by reflected light when mature, 20-58 μm in diam; sporangial wall transparent, thin, smooth, deliquescent, leaving a small collar at the base of the columella; apophyses conspicuous, funnel-shaped or bell-shaped, 10-46 μm high, 11-40 μm in diam at the widest part, wall of apophyses smooth, light greyish brown, slightly thicker than the columellae walls; columellae hemispherical, thin-walled, subhyaline to light greyish brown, 18-28 μm in diam. Sporangiospores mostly oblong, occasionally subglobose, very light brown in mass, subhyaline individually, thin-walled, smooth, 5.4-8.0 $\times$ 4.0-5.7 μm . Zygospores not seen.

Colonies on plain agar consisting of a very sparse mostly submerged growth of vegetative hyphae forming a few aerial stolons and rhizoids. Sporangioophores generally developed at the ends of stolons with a rhizoidal structure below, erect, straight or slightly curved, smooth or occasionally roughened near the base and apex; internal thickening and darkening of the sporangioophore wall below apophyses more pronounced. Rhizoids thin-walled, colorless, light greyish brown at the place of origin, smooth, unbranched or little branched near the place of origin, 2.3-4.6 μm in diam.

Materials examined:

PCM 597, Type, isolated from soil of a mango orchard, Deoria, U.P., India, June 1976.

PCM 611, isolated from soil of a grassy site, near Thawai ka pul, Gorakhpur, U.P., India, June 1977.

Subcultures of the type culture will be sent to ATCC, CBS and NRRL.

In general morphology *Apophysomyces* is close to *Absidia* van Tieghem (Hesseltine and Ellis, 1964; Zycha, Siepmann and Linnemann, 1969). Like *Absidia* it has pyriform, apophysate, multispored sporangia developed on spoangioophores which arise on stolons but typically not opposite rhizoids. However *Apophysomyces* differs significantly from *Absidia* in having more pronounced apophyses which are funnel-shaped to bell-shaped, in having a hyphal segment, reminiscent of the 'foot-cell' of *Aspergillus*, at the base of the sporangioophore, and in the development of sporangioophores opposite rhizoids on plain agar medium. Furthermore, the characteristic darkening and thickening of the sporangioophore wall below the apophysis, making the lumen of the sporangioophore narrow at that point, is not found in any genus related to *Apophysomyces*.

The manner of development of the sporangioophores of *Apophysomyces* on plain agar medium is reminiscent of that described for *Saksenaea vasiformis* Saksena (Saksena, 1953). The sporangium-forming hypha from its end produces a rhizoidal

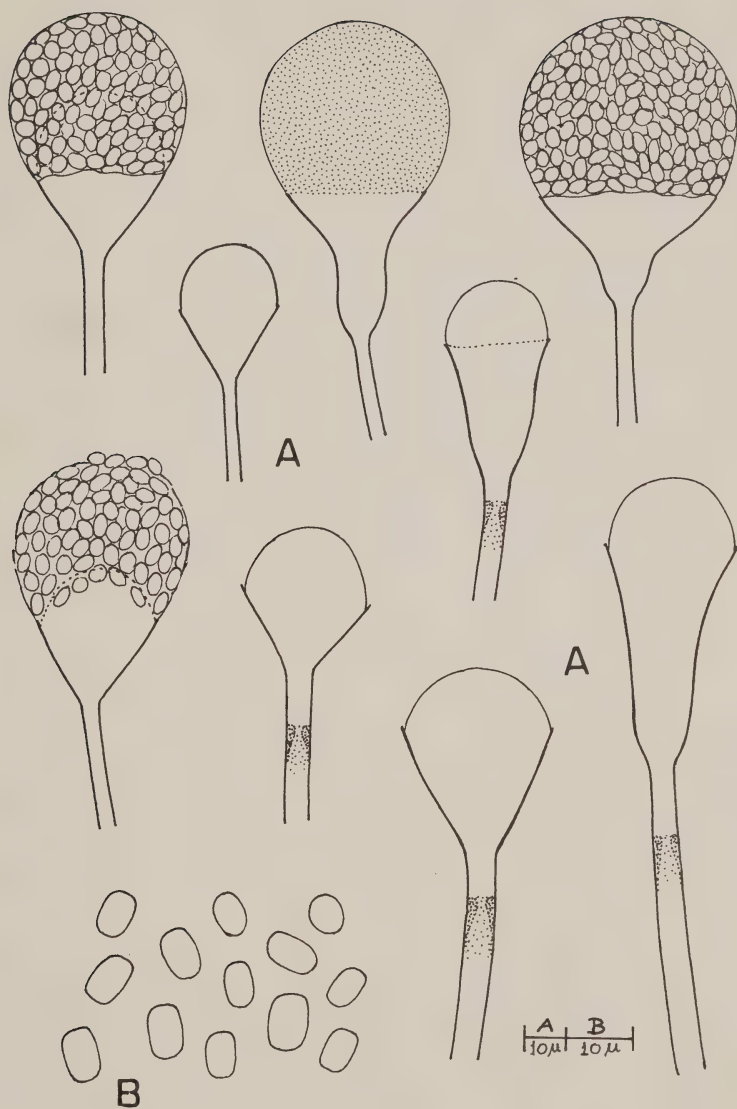


FIG. 2. *Apophysomyces elegans*. A, sporangia. B, sporangio-phores.

complex below which is submerged in agar and an erect sporangiophore develops in the opposite direction. However, the similarity stops there for the morphology of the sporangia in the two genera is entirely different.

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The authors thank Rev. Fr. Robert C.S.T. for translating the diagnoses into Latin. The work was supported by grant No. F.23-613/77(SR.II) from the U. G. C., India.

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AN ORTHOGRAPHIC CORRECTION

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The binomials *Trichophyton longifusus* and *Trichophyton ajelloi* var. *nana* were found to be orthographically incorrect. The correct designations, namely *Trichophyton longifusum* and *Trichophyton ajelloi* var. *nanum*, are therefore proposed.

The genus *Keratinomyces* Vanbreuseghem 1952 (5), was originally differentiated from other allied genera by the absence of microconidia and by the production of long, smooth, thick-walled, cylindrical to fusiform macroconidia. Later, when many isolates recovered from soil in the United States of America were found to produce variable numbers of microconidia, and when the perfect state of the type species of the genus *Keratinomyces*, namely *K. ajelloi*, was classified by Dawson and Gentles (2) under the genus *Arthroderma* (*A. uncinatum*), where the perfect states of all other *Trichophyton*s belonged, Ajello (1) rejected the genus *Keratinomyces* and transferred *K. ajelloi* to the genus *Trichophyton* as follows: *Trichophyton ajelloi* (Vanbreuseghem, 1952) Ajello 1968.

For the same reasons, the second species in the genus *Keratinomyces*, namely *K. longifusus*, described by Florian and Galgoczy (3), and *K. ajelloi* var. *nana*, described by Kunert and Hejtmanek (4), were transferred to the genus *Trichophyton* (1). The combinations were designated as follows:

Trichophyton longifusus (Florian and Galgoczy, 1964)
Ajello 1968 and

Trichophyton ajelloi var. *nana* (Kunert and Hejtmanek,
1964) Ajello 1968

These two proposed binomials are now considered to be orthographically incorrect. In accordance with Recommendation 75A of the International Code of Botanical Nomenclature, the names of these two taxa are emended as follows:

from *Trichophyton longifusus* to *Trichophyton longifusum*,
and from *Trichophyton ajelloi* var. *nana* to
Trichophyton ajelloi var. *nanum*

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MYCOFLORA SAXIMONTANENSIS EXSICCATA CENTUM XVI¹

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Centum XVI of the Mycoflora consists of fungi other than rusts. Of the total, 47 were collected in Wyoming. Thirteen are from the Grand Teton National Park. The remainder are distributed as follows: Arizona 29, Nevada 1, New Mexico 2, Colorado 11, Utah 3 and Idaho 7.

Included in the issue is the isotype of *Emericellopsis stolckiae* D. E. Davidson et Martha Christensen, No. 1522.

Clarification is needed with respect to the data published with the original description of *Cercospora thermopsidis* Earle (Bull. N. Y. Bot. Gard. 2:7:348. 1902). Collection data given are: "On *Thermopsis arenaria*, Glen Rocks, Montana, July 15, 1901, Aven Nelson, No. 4818." This should have read: On *Thermopsis arinosa* A. Nels., Glenrock, Converse County, Wyoming. This correction has been made by Charles Chupp in his 1953 Monograph of *Cercospora*, p. 337. *T. arinosa* is now considered a synonym of *T. rhombifolia* Nutt. ex Rich.

No. 1583 of this issue is *C. thermopsidis* Earle. The specimen was distributed, in part, with a printed label which reads "*Cercospora thermopsidis* Earle n. sp." This suggests that the specimen might be an isotype or holotype. The "n. sp." should, however, not have been appended as the specimen could not be considered as either of the two types. It was collected in the same month and year as the type but by a different collector and in a different county from the type, although in the same general area of Wyoming. Names of some collectors are abbreviated as follows: Wilhelm G. Solheim, WGS; Ragnhild Solheim, RS; George B. Cummins, GBC; Robert L. Gilbertson, RLG; J. Page Lindsey, JPL. Microscopic measurements are given in μm . State abbreviations are those of the U.S. Postal Service.

¹ Contribution from the Department of Botany and the Rocky Mountain Herbarium of the University of Wyoming.

² The author expresses his appreciation to the several individuals who have contributed to the collections as listed throughout the paper. Determination of some of the host species has been made by Dr. C. T. Mason, Jr., Dr. Frank W. Gould, Charlotte Reeder, Jack Humbles, R. L. Hartman and Gary Pierce, to whom grateful acknowledgement is given. Determination of several of the fungi has been made by Drs. R. L. Gilbertson and Sam Shushan, to whom the author is much indebted. Drs. R. B. Streets and L. M. Blank each supplied a named specimen. The late Dr. Roderick Sprague identified one, as did the late Prof. F. S. Earle.

1501. *ALBUGO CANDIDA* (Pers. ex Chev.) Kuntze. On *Descurania pinnata* (Walt.) Britt. West Speedway, Tucson, Pima Co., AZ, 1 Mar. 1973. WGS, RLG & GBC 7221.
1502. *BASIDIOPHORA ENTOSPORA* Roze et Cornu. Sporangioophores 174-307 x 10-16 below, 15-17 above, sterigmata 7-10 x 1.7-2; sporangia 25-45 x 24-39. On leaves of *Aster chilensis* Nees ssp. *adscendens* (Lindl.) Cronq. Host determined by Jack Humbles. South Brush Creek Camp Ground, Medicine Bow Mts., Carbon Co., WY, 28 Aug. 1967. WGS 6649.
1503. *PERONOSPORA ARBORESCENS* (Berk.) de By. Conidiophores 121-400 x 7-10, ultimate branches 5-10; conidia 13-22 x 12-17; oospores 21-42, wall 3.5. On leaves of *Argemone polyanthemus* (Fedde) G. B. Ownb. Wheatland cutoff, State Highway 34, near Bluegrass River, Platte Co., WY, 26 June 1962. WGS 6261.
1504. *PERONOSPORA ARTHURI* Farl. Conidiophores 170-337 x 6-8, ultimate branches 10-15.5; conidia 18-24 x 13-19; oospores 19-26. On leaves of *Camissonia chamaenerioides* (Gray) Raven. Host determined by C. T. Mason, Jr. Pantano Draw, south of Saguaro Nat. Monument, Pima Co., AZ, 15 Mar. 1973. WGS & RLG 7265.
1505. *PERONOSPORA CORYDALIS* de By. Conidiophores 215-383 x 6.5-8.5, ultimate branches 10-14; conidia 17-23 x 14-23; oospores 35-38. On leaves of *Corydalis aurea* Willd. East Speedway Blvd., near Tanque Verde, Tucson, Pima Co., AZ, 15 Mar. 1973. WGS & RLG 7268.
1506. *PERONOSPORA ECHINOSPERMI* Swingle. Conidiophores 143-460 x 7.5-8.6; conidia 24-33 x 15-22.5. On leaves of *Lappula redowskii* (Hornem.) Greene. Host determined by C. T. Mason, Jr. Tanque Verde Draw, Tucson, Pima Co., AZ, 15 Feb. 1973. WGS, RLG & GBC 7212.
1507. *PERONOSPORA FICARIAE* Tul. Conidiophores 175-430 x 7-10; conidia 24-31 x 21-24. On leaves of *Ranunculus acrisiformis* Gray. 9.2 miles north of junction at Jackson Lake Lodge, Grand Teton Nat. Park, WY, 25 July 1955. WGS & RS 4131.
1508. *PERONOSPORA LEPIDII* (McAlp.) G. W. Wilson. Conidiophores 110-398 x 6-15, ultimate branches 10-20; conidia 18-36 x 18-23. On leaves of *Lepidium medium* Greene. Host determined by C. T. Mason, Jr. Finger Rock Canyon, Santa Catalina Mts., Tucson, Pima Co., AZ, 15 Feb. 1973. WGS, RLG & GBC 7208.
1509. *PERONOSPORA LEPIDII* (McAlp.) G. W. Wilson. Conidiophores 138-353 x 6-7; conidia broadly elliptical, ends rounded, 26-35 x 17-21. On leaves of *Lepidium thurberi* Woot. Sandario Road, west of Tucson Mts., Tucson, AZ, 1 Mar. 1973. GBC.
1510. *PERONOSPORA PARASITICA* Pers. ex Fr. Conidiophores 174-296 x 10-14; conidia 12-29 x 12-21. On leaves of *Arabis drummondii* Gray. Near Rob Roy Reservoir, Snowy Range Division, Medicine Bow Nat. Forest, Medicine Bow Mts., WY, 27 July 1973. WGS, WGS II & RS 7290. This appears to be a new host.
1511. *PERONOSPORA PARASITICA* Pers. ex Fr. Conidiophores 160-353 x 11-14; conidia 18-27 x 19-22. Mostly on leaves of *Descurania pinnata* (Walt.) Britt. West Speedway, Tucson, Pima Co., AZ, 1 Mar. 1973. WGS, RLG & GBC 7222.
1512. *PERONOSPORA PARASITICA* Pers. ex Fr. Conidiophores 246-400 x 10-14; conidia 18-28 x 16-23. Mostly on stems in inflorescences of *Descurania pinnata* (Walt.) Britt. Colossal Cave Co. Park, Rincon Mts., Pima Co., AZ, 22 Mar. 1973. RLG, GBC & JPL 10943. Numbers 1511 and 1512 occur on the same host. The effect of the fungus on the host is, however, quite different. In 1511 it is primarily the leaves which are affected while in 1512 the stems are hypertrophied and greatly deformed.

1513. *PERONOSPORA PARASITICA* Pers. ex Fr. Conidiophores 184-368 x 10-14; conidia 18-34 x 17-26. On basal leaves of *Descurania richardsonii* (Sweet) O. E. Schulz ssp. *procera* Breit. Host determined by Jack Humbles. Near Rob Roy Reservoir, Snowy Range Division, Medicine Bow Nat. Forest, Medicine Bow Mts., WY, 27 July 1973. WGS, WGS II & RS 7292.
1514. *PERONOSPORA PARASITICA* Pers. ex Fr. Conidiophores 352-460 x 10-18; conidia subsphaerical, 18-25 x 14-22. On leaves of *Draba cuneifolia* Nutt. Near Rocking K Ranch, Colossal Cave Road, east of Tucson, AZ, 22 Mar. 1973. GBC 73-34.
1515. *PERONOSPORA PARASITICA* Pers. ex Fr. Conidiophores 276-624 x 12-16; conidia 15-26 x 13-20. On leaves of *Lepidium lasiocarpum* Nutt. Picture Rock Pass, west of Tucson, Pima Co., AZ, 1 Mar. 1973. WGS, RLG & GBC 7236.
1516. *PERONOSPORA PARASITICA* Pers. ex Fr. Conidiophores 230-537 x 10-14; conidia 15-24 x 14-19. On leaves of *Lepidium lasiocarpum* Nutt. Pantano Draw, south of Saguaro Nat. Monument, Pima Co., AZ, 15 Mar. 1973. WGS & RLG 7267. This specimen is included for comparison of measurements with the preceding number.
1517. *PERONOSPORA PARASITICA* Pers. ex Fr. Conidiophores 226-307 x 9-16; conidia subsphaerical 16-23 x 13-18. On leaves of *Lepidium medium* Greene. Host determined by C. T. Mason, Jr. West Speedway, Tucson, Pima Co., AZ, 1 Mar. 1973. WGS, RLG & GBC 7224.
1518. *PERONOSPORA PARASITICA* Pers. ex Fr. Conidiophores 430-506 x 14-20; conidia 17-24 x 14-17. On leaves of *Lesquerella purpurea* (Gray) Wats. Near Red Hill Farm Road, about 5 miles north of old Benson Highway, Pima Co., AZ, 16 Mar. 1973. GBC 73-30.
1519. *PERONOSPORA PARASITICA* Pers. ex Fr. Conidiophores 200-385 x 10-14; conidia 21-30 x 14-25. On leaves of *Lesquerella purpurea* (Gray) Wats. Colossal Cave Co. Park, Rincon Mts., Pima Co., AZ, 22 Mar. 1973. RLG, GBC 10942.
1520. *PERONOSPORA TRIFOLIORUM* de By. Conidiophores 180-322 x 8-12; conidia 21-24 x 15-20; oospores 31-38. On leaves of *Astragalus alpinus* L. Host determined by Jack Humbles and Charlotte Reeder. Middle Crow Creek, Laramie Mts., Albany Co., WY, 29 July 1967. WGS & RS 6616.
1521. *PLASMOPARA GERANII* (Farl.) Berl. et DeT. Conidiophores 139-215 x 8.5-14; conidia 22-35 x 19-25. On leaves of *Geranium richardsonii* Fisch. et Trautv. Up from Pole Creek Camp Ground towards Pole Mtn., Laramie Mts., Albany Co., WY, 5 July 1972, Alt. 8,300 ft. WGS & RS 7178.

EUROTIALES

1522. *EMERICELLOPSIS STOLKIAE* D. E. David. et M. Christ. On cornmeal agar, 3.5 weeks at room temp. Isolated from soil near margin of a saline (MgSO₄) lake, Twin Buttes Lake, Albany Co., WY, Mar. 1967. ISOTYPE.

PYRENOMYCETES AND DISCOMYCETES

1523. *COLEROA RUBICOLA* (Ell. et Ev.) E. Mueller. Perithecia 80-160, ostiole plane, 12-28; asci 40-47 x 13-18; ascospores 12-16 x 6.2-8. On leaves of *Rubus strigosus* Michx. Host determined by C. T. Mason, Jr. Near Summerhaven, Mt. Lemmon, Santa Catalina Mts., Pima Co., AZ, 17 Sept. 1954. P. D. Keener.
1524. *ERYSPHE CICHORACEARUM* DC. Cleistothecia 104-150 diam, wall cells 10-17; asci 55-65 x 24-31; ascospores 24-28 x 15-16. On leaves

- of *Aster adscendens* Lindl. Host determined by R. L. Hartman. 28 miles west of Cheyenne, Happy Jack Road, Medicine Bow Nat. Forest, at spring, Albany Co., WY, 17 Oct. 1969, alt. 7,850 ft. WGS & RS 6847.
1525. *ERYSIPHE HORRIDULA* (Wallr.) Lév. On *Cryptantha barbigera* (Gray) Greene. Camino Padre Isadorro, Santa Catalina Foothills, Tucson, Pima Co., AZ, 30 Mar. 1970. RLG 9336.
1526. *ERYSIPHE HORRIDULA* (Wallr.) Lév. Cleistothecia 131-208; asci 55-72 x 27-31; ascospores 18-24 x 10-14. On leaves and stems, cleistothecia on stems of *Lappula redowskii* (Hornem.) Greene. Colossal Cave Co. Park, Rincon Mts., Pima Co., AZ, 22 Mar. 1973. RLG 10944.
1527. *NECTRIA CINNABARINA* Tode ex Fr.
TUBERCULARIA VULGARIS Tode stage. On twigs and bark of *Acer glabrum* Torr. Roadside below Mt. Lemmon, Santa Catalina Mts., Pima Co., AZ, 5 Oct. 1966. WGS & Mycology Class 6516.
1528. *OPHIOPOLUS FESTUCAE* Tracy et Earle. Ascocarp elliptical, 215-460 x 184-353, ostiole a slit; asci 76-125 x 16-21; ascospores 45-62 x 3.5. On leaves of *Festuca idahoensis* Elmer. Host determined by Charlotte Reeder. University of Wyoming Science Camp, Medicine Bow Mts., Albany Co., WY, 30 June 1939, alt. 9,800 ft. WGS 1648.
1529. *PHYLLACHORA EPICAMPIS* Orton. Asci 118-148 x 13.5; ascospores 20-24 x 8-10. On leaves of *Muhlenbergia metcalfeii* M. E. Jones. Host determined by Charlotte Reeder. Organ Mts., NM, 28 Nov. 1939. Mr. and Mrs. L. N. Goodding A9879.
1530. *PHYLLACHORA EPICAMPIS* Orton. On leaves of *Muhlenbergia ringens* (Benth.) Hitchc. Sycamore Canyon, Santa Cruz Co., AZ, 29 Mar. 1972. WGS, RLG, E. Canfield, C. T. Mason, Jr. & J. McHenry 7158.
1531. *SPHAEROTHECA FULIGINEA* (Schlecht. ex Fr.) Pollacci. On leaves of *Pedicularis bracteosa* Benth. var. *paysoniana* (Pennell) Cronq. Brainard Lake, Boulder Co., CO, 8 Sept. 1970, alt. 10,350 ft. H. R. Simms sf-752.
1532. *SYNCARPELLA TUMEFACIENS* (Ell. et Harkn.) Theiss. et Syd. Immature. On stems of *Artemisia tridentata* Nutt. Muddy Gap, north-west Carbon Co., WY, 25 July 1939, alt. 6,250 ft. WGS & RS 1714.
1533. *VALSA NIVEA* Hoffm. ex Fr. Asci fusiform, 36-43 x 5.5-6; ascospores biseriate, curved, 8.3-10 x 1.1-1.5. On dead, standing *Populus tremuloides* Michx. Near Monarch Pass, Gunnison-Chaffee County line, CO, 18 June 1935, alt. 9,000 ft. P. F. and V. L. Shope 908. Determined by Sam Shushan.
1534. *CIBORINIA CONFUNDENS* (Whet.) Whet. Sclerotial stage. On leaves of *Populus tremuloides* Michx. Near Sandstone Ranger Station, Sierra Madre Mts., Carbon Co., WY, 13 July 1939. WGS 1669.
1535. *DASYSCYPHA ARIDA* (Phill.) Sacc. Asci 69-76 x 7-8, ascospores 7-8.5 x 3.5-4.5. On bark of fallen *Abies lasiocarpa* (Hook.) Nutt. Brooklyn Lake, Medicine Bow Mts., Albany Co., WY, 4 Aug. 1970, alt. 10,400 ft. WGS & RS 6974.
1536. *DASYSCYPHA ARIDA* (Phill.) Sacc. Asci 62-70 x 7, ascospores 7-11 x 3.5-5. On branches of fallen *Abies lasiocarpa* (Hook.) Nutt. Upstream from Nash Fork Bridge, Medicine Bow Mts., Albany Co., WY, 22 Aug. 1970, alt. 9,400 ft. WGS & RS 7022.
1537. *DASYSCYPHA FUSCOSANGUINEA* Rehm. Asci 76-104 x 7-8, ascospores 11-16 x 3.5-6. On twigs of *Pinus contorta* Dougl. ex Loud. 9.2 miles north of junction at Jackson Lake Lodge, Grand Teton Nat. Park, WY, 29 June 1955, alt. 6,850 ft. WGS & RS 3746.

1538. *DASYSCYPHA OBLONGISPORA* Hahn et Ayers. Asci 66-80 x 7-8, ascospores 8-12 x 4-6. On bark of fallen *Pinus contorta* Dougl. ex Loud. 4.2 miles west of entrance to Medicine Bow Nat. Forest on Laramie-Fox Park Road, below Dry Park, Medicine Bow Mts., Albany Co., WY, 25 June 1970, alt. 8,900 ft. WGS & RS 6943.
1539. *DISCINA ANCILIS* (Pers.) Sacc. Apothecia 2-7 cm diam; asci 350-537 x 24-28; ascospores with one large central vacuole, 34-42 x 13-17. On soil, wood and conifer needles in *Pinus contorta* Dougl. ex Loud. forest. 4.2 miles west of entrance to Medicine Bow Nat. Forest on Laramie-Fox Park Road, below Dry Park, Medicine Bow Mts., Albany Co., WY, 25 June 1970, alt. 8,900 ft. WGS & RS 6892.
1540. *GOPYXIS CUPULARIS* (L.) Sacc. Apothecia smooth; asci cylindrical, 208-225 x 10-12; ascospores 14-21 x 8-10; paraphyses slender, as long as asci, slightly inflated at tip. On soil in burned over area. French Creek, Medicine Bow Mts., Carbon Co., WY, 17 July 1961, alt. 9,400 ft. WGS & RS 5909.
1541. *LACHNELLULA CHRYSOPHTHALMA* (Pers. ex Fr.) Karst. Asci 72-76 x 5-7; ascospores spherical, 7-8. On bark of fallen *Abies lasiocarpa* (Hook.) Nutt. Nash Fork Bridge, Medicine Bow Mts., Albany Co., WY, 22 Aug. 1970, alt. 9,400 ft. WGS & RS 7015.
1542. *PSEUDOPEZIZA MEDICAGINIS* (Lib.) Sacc. On *Medicago sativa* L. Mammoth, AZ, 30 Nov. 1966. R. B. Streets. Determined by R. B. Streets.
1543. *PSEUDOPLECTANIA NIGRELLA* (Pers.) Fckl. Apothecia disciform to slightly saucers shaped or with cup, 4-20 mm across, underside with gray to brown-black, smooth hairs; paraphyses filiform, slightly enlarged at tip to slightly bulbous, hyaline below, brown to olive-brown above, about 3-4 diam; asci cylindrical, 246-325 x 13-17; ascospores spherical, smooth, hyaline, no oil drop, 11-14 diam. Among mosses, lichens and pine needles on soil in coniferous forest. Along stream, 4.2 miles from east entrance to Medicine Bow Nat. Forest, east of Dry Park, Medicine Bow Mts., Albany Co., WY, 25 June 1970, alt. 8,900 ft. WGS, RS & V. Solheim 6908.

USTILAGINALES AND TREMELLALES

1544. *ENTYLOMA COMPOSITARUM* Farl. Chlamydospores smooth, 9-12, wall 1-1.5. On leaves of *Erigeron speciosus* (Lindl.) DC. Host determined by Gary Pearce. North of Research Station pasture, Grand Teton Nat. Park, WY, 4 July 1955, alt. 6,750 ft. WGS & RS 3849.
1545. *ENTYLOMA WINTERI* Linh. On *Delphinium occidentale* (Wats.) Wats. North Ridge up Pilgrim Creek, Teton Co., WY, 21 July 1956, alt. 7,000 ft. WGS & RS 4603.
1546. *USTILAGO BULLATA* Berk. On *Bromus rubens* L. Box Canyon between Price and Superior, Pinal Co., AZ, 20 Mar. 1970. WGS, RLG & A. B. Budington 6861.
1547. *USTILAGO HYPODYTIS* (Schlecht.) Fr. On *Stipa comata* Trin. et Rupr. Wheatland Cutoff, State Highway 34, Laramie Mts., Albany Co., WY, 30 Sept. 1956, alt. 6,100 ft. WGS & RS 4667.
1548. *USTILAGO NEGLECTA* Niessl Syn. *U. boutelouae* Kell. et Swingle. On *Bouteloua aristidoides* (H.B.K.) Griseb. About 3 miles south of Post Office, Marana, Pima Co., AZ, 26 Nov. 1963. Collected and determined by L. M. Blank.
1549. *GUEPINIOPSIS ALPINUS* (Tracy et Earle) Brasfield. On dead conifer twigs and stems. 19.4 miles from Biological Research Station on road to Togwotee Pass, Wind River Mts., Teton Co., WY, 3 July 1956,

alt. 8,250 ft. WGS & RS 4482.

POLYPORALES AND GASTEROMYCETES

1550. *CONIOPHORA CORRUGIS* Burt. On bark of fallen conifer. 10.5 miles north of junction at Jackson Lake Lodge, Grand Teton Nat. Park, WY, 28 June 1971, alt. 6,800 ft. WGS & RS 7075. Determined by RLG.
1551. *CONIOPHORA CORRUGIS* Burt. On bark of fallen *Pinus contorta* Dougl. ex Loud. Biological Research Station, Grand Teton Nat. Park, WY, 12 Aug. 1957, alt. 6,750 ft. WGS & RS 5333. Determined by RLG.
1552. *FOMES IGNIARIUS* (L. ex Fr.) Kickx. On *Populus tremuloides* Michx. Near Swan Lake, Grand Teton Nat. Park, WY, 5 July 1956, alt. 6,800 ft. WGS & RS 4506.
1553. *POLYPORUS ADUSTUS* Willd. ex Fr. On fallen log of *Populus tremuloides* Michx. Just below Forest boundary on Lake Owen Road, Medicine Bow Mts., Albany Co., WY, 13 Sept. 1973, alt. 8,300 ft. WGS & RS 7374. Determined by RLG.
1554. *POLYPORUS DICHROUS* Fr. On fallen *Pinus contorta* Dougl. ex Loud. 9.2 miles north of junction at Jackson Lake Lodge, Grand Teton Nat. Park, WY, 26 June 1955, alt. 6,850 ft. WGS 3716.
1555. *CALVATIA CYATHIFORMIS* (Bosc) Morg. In short grass prairie (*Bouteloua gracilis*-*Buchloe dactyloides*). Pawnee Nat. Grassland, 19 miles north of Nunn, Weld Co. CO, 3 Feb. 1970, alt. 5,600 ft. R. S. Egan, V. Evanson, R. D. Fogel & S. Shushan. Determined by Sam Shushan.
1556. *GASTEROCYBE LATERITIA* Watling. In lawn. 1703 Kearney, Laramie, WY, 27 July 1970, alt. 7,150 ft. WGS & RS 6924.
1557. *SECOTIUM AGARICOIDES* (Czern.) Hollos. On sandy roadside bank. Six miles northeast of Brush, near Hillrose, Morgan Co., CO, 5 Mar. 1970. S. Shushan sf-901. Determined by Sam Shushan.

FUNGI IMPERFECTI

SPHAEROPSIDALES

1558. *CYTOSPORA CORNI* West. Stromata circular, 380-460; conidia 5-7 x 1-1.5. On twigs of *Cornus stolonifera* Michx., variegated form. In garden at 20th St. & Mariposa Ave., Boulder, Boulder Co., CO, 20 Aug. 1966, alt. 5,400 ft. S. Shushan sf-646. Determined by W. G. Solheim.
1559. *CYTOSPORA CORNI* West. Conidia 6-8 x 1-1.5. On twigs of *Cornus stolonifera* Michx. 1703 Kearney, Laramie, Albany Co., WY, 9 June 1971, alt. 7,150 ft. WGS 7063.
1560. *KELLERMANNIA ANOMALA* (Cke.) Hoehn. Pycnidia 337-460; conidia without spine 52-90 x 9-14, spine 14-41 long. On leaves of *Yucca glauca* Nutt. 18 miles northeast of Ault, Weld Co., CO, 28 July 1970, alt. 5,300 ft. H. R. Simms, S. Shushan & R. Fogel sf-10,002. Determined by WGS.
1561. *PHYLLOSTICTA BRUNNEA* Dearn. et Barth. Pycnidia amphigenous, effused, abundant, 104-140; conidia bacilliform, straight or slightly curved, 5-6.5 x 1-1.5. (Agrees with F. Columb. 5040, Isotype). On leaves of *Populus fremontii* Wats. Indian Creek Winter Sports Area, Prescott Nat. Forest, south of Prescott, Yavapai Co., AZ, 22 Oct. 1956. P. D. Keener. Determined by WGS.
1562. *SCAPHIDIUM BOUTELOUAE* Clements. Conidia clavate, dilute olivaceous, straight or slightly curved, 1-septate, slightly constricted

- at septum, 19-31 x 2.8-5.3. On leaves of *Bouteloua curtipendula* (Michx.) Torr. Host determined by Frank W. Gould. Highway 180, 4 miles south of Silver City, NM, 2 Oct. 1948, alt. 5,700 ft. WGS & RS 2390. Determined by Roderick Sprague.
1563. *SEPTORIA SCUTELLARIAE* Thuem. Pycnidia 63-166, ostiole 43-99; conidia 36-89 x 1.7-2.5. On leaves of *Scutellaria galericulata* L. 4.1 miles west of Idaho-Wyoming State line, east of Ashton, Targhee Nat. Forest, Fremont Co., ID, 2 Aug. 1957, alt. 6,250 ft. WGS & RS 5272. First report for Idaho.
1564. *SEPTORIA SIBERICA* Thuem. Pycnidia epiphyllous, 1-2-few per spot, 104-170, ostiole 40-100; conidia 38-90 x 1-2, 1-4-septate. On leaves of *Ribes inerme* Rydb. Host determined by R. L. Hartman. Road east of Snake River Camp Ground, south of Flag Ranch, Teton Nat. Forest, Teton Co., WY, 27 Aug. 1961, alt. 6,800 ft. WGS & RS 6136.
1565. *SEPTORIA SIGNALENSIS* Solh. Pycnidia 86-156, ostiole 34-45; conidia 45-73 x 2.5-4, 1-2-septate. On leaves of *Symphoricarpos albus* (L.) Blake var. *laevigatus* (Fern.) Blake. Hoback Canyon, Sublette Co., WY, 9 Aug. 1969, alt. 6,050 ft. WGS & RS 6813.
1566. *SEPTORIA SIGNALENSIS* Solh. Pycnidia 93-139, ostiole 33-66; conidia 33-78 x 2.8-3.5, 0-1-septate. On leaves of *Symphoricarpos vaccinioides* Rydb. This is a new host for this fungus. Howard Spring Camp Ground, Targhee Nat. Forest, Fremont Co., ID, 11 July 1957, alt. 7,000 ft. WGS & RS 4978.
1567. *SEPTORIA URTICAE* Rob. ex Desm. Pycnidia 41-104; conidia 30-48 x 1-1.5, obscurely 1-2-septate or nonseptate. On leaves of *Urtica gracilentia* Greene. High Peak Trail, Mt. Graham, Hospital Flats, Pinaleno Mts., Graham Co., AZ, 16 Aug. 1962. P. D. Keener. Determined by WGS. *S. urticaria* Tharp is similar if not the same as the above species.
- MELANCONIALES
1568. *CYLINDROSPORIUM CONSERVANS* Peck et *Phyllosticta* sp. Acervuli epiphyllous, circular, 156-260 diam; conidia 45-80 x 3.5-4, 1-2-3-septate. On leaves of *Salix lasiandra* Benth. var. *caudata* (Nutt.) Sudw. Wheatland Cutoff, State Highway 34, Laramie Mts., WY, 1 Oct. 1955, alt. 6,200 ft. WGS & Mycology Class 4422.
1569. *GLOEOSPORIUM RIBIS* (Lib.) Mont. et Desm. Conidia 20-31 x 4.5-7. On leaves of *Ribes inerme* Rydb. Snake River Camp Ground, south of Flag Ranch, north of Grand Teton Nat. Park, Teton Nat. Forest, Teton Co., WY, 27 Aug. 1961, alt. 6,800 ft. WGS & RS 6135.
1570. *MARSSONINA BRUNNEA* (Ell. et Ev.) Magn. On leaves of *Populus tremuloides* Michx. Robber's Roost Road, North Rim of Grand Canyon, AZ, 15 Aug. 1957. P. D. Keener. Determined by WGS.
1971. *MARSSONINA POTENTILLAE* (Desm.) Magn. Acervuli 180-491 x 307; conidia 17-24 x 6-7. On leaves of *Potentilla fissa* Nutt. Host determined by R. L. Hartman. Vedaawoo, Pole Mtn. Division, Medicine Bow Nat. Forest, Laramie Mts., Albany Co., WY, 16 Aug. 1967. WGS & RS 6647.
1572. *SEPTOGLOEUM RHOPALOIDEUM* Dearn. et Bisby. Acervuli hypophyllous, subsphaerical to elliptical, 140-460 x 104-306; conidia 34-83 x 9-11, 1-4-septate. On leaves of *Populus tremuloides* Michx. Road from Pearl, CO into Hayden Division, Medicine Bow Nat. Forest at junction with Big Creek Road, 6.1 miles north of CO-WY State line, Sierra Madre Mts., Carbon Co., WY, 31 Aug. 1966. WGS & E. Andrews 6465.

HYPHOMYCETES

1573. *ALTERNARIA TENUIS* Auct. et *Peronospora arthurii* Farl. a) Conidiophores amphigenous, effused on spots, 40-70 x 3-4; conidia clavate, 28-87 x 11-22, with 3-7, mostly 5-6 cross walls and with 2 or more cells with longitudinal septa, attenuated below into a stipe 35-50 long. b) Conidiophores 184-470 x 6-9, conidia 26-34 x 17-24. On leaves of *Oenothera primiveris* Gray. Pantano Draw, south of Saguaro Nat. Monument, Tucson, Pima Co., AZ, 15 Mar. 1973. WGS & RLG 7266.
1574. *CERCOSPORA BETICOLA* Sacc. On leaves of *Beta vulgaris* L., sugar beet. United States Department of Agriculture Sugar Beet Experiment Farm, Fort Collins, CO, 4 Oct. 1930. WGS 79.
1575. *CERCOSPORA BETICOLA* Sacc. On leaves of *Beta vulgaris* L., red beet. Colorado State Agricultural College Horticultural Gardens, Fort Collins, CO, 4 Oct. 1930. WGS 81.
1576. *CERCOSPORA FRASERAE* Ell. et Ev. Conidiophores in very compact masses, 20-40 x 3-3.5; conidia 90-111 x 3-3.5, 1-4 mostly 3-septate. On leaves of *Frasera speciosa* Dougl. ex Griesb. Moose Island, Biological Research Station, Grand Teton Nat. Park, WY, 3 July 1955, alt. 6,740 ft. WGS & RS 3839.
1577. *CERCOSPORA FRASERAE* Ell. et Ev. Conidiophores 20-30 x 2.5-3.5; conidia 73-150 x 2.5-4, 2-8-septate. On leaves of *Swertia radiata* (Kellogg) Kuntze. Howard Spring Camp, Togwotee Nat. Forest, Fremont Co., ID, 11 July 1957, alt. 7,000 ft. WGS & RS 4961.
1578. *CERCOSPORA GERANII* Kell. et Swingle. Conidia 41-83 x 3.5-4, 1-3-septate. On leaves of *Geranium richardsonii* Fisch. et Mey. Up from Pole Creek Camp Ground, Laramie Mts., Albany Co., WY, 5 July 1972, alt. 8,300 ft. WGS & RS 7180.
1579. *CERCOSPORA GERANII* Kell. et Swingle. Conidiophores 24-42 x 3.5-4.5, 1-2-septate; conidia 41-110 x 3-4, 1-5-septate. On leaves of *Geranium viscosissimum* Fisch. et Mey. Base of ridge north of Biological Research Station, Grand Teton Nat. Park, WY, 29 July 1955, alt. 6,750 ft. WGS & RS 4180.
1580. *CERCOSPORA ITHACENSIS* Chupp. Conidiophores 23-43 x 4-5.5; conidia 33-106 x 3-5.5, 0-1-4-septate. On leaves of *Geranium viscosissimum* Fisch. et Mey. 0.5 mile above Cliff Creek, Hoback Canyon, Sublette Co., WY, 15 July 1957, alt. 6,400 ft. WGS & RS 5050.
1581. *CERCOSPORA ROSICOLA* Pass. Conidiophores 23-50 x 3-5; conidia obclavate, dilute olivaceous, 37-66 x 3-7, 2-3-septate. On *Rosa* sp. Cemetery at Cripple Creek, Teller Co., CO, 24 Aug. 1946, alt. 10,200 ft. WGS, WGS II & RS 2146. Determined by John Baxter.
1582. *CERCOSPORA SYMPHORICARPI* Ell. et Ev. Conidiophores 24-35 x 3.5-4; conidia 25-43 x 4-5, 1-3-septate. On leaves of *Symphoricarpos* sp. Moose Ponds west of Moose, Grand Teton Nat. Park, WY, 8 July 1955, alt. 6,500 ft. WGS & RS 3904.
1583. *CERCOSPORA THERMOPSIDIS* Earle. On leaves of *Thermopsis rhombifolia* Nutt. ex Rich. Syn. *T. arinosa* A. Nels. Casper, Natrona Co., WY, 6 July 1901. L. N. Goodding 205. Determined by F. S. Earle.
1584. *DIDYMARIA CLEMATIDIS* Cke. et Harkn. Conidiophores hypophyllous, densely tufted, tufts up to 110 in diam; conidia 20-38 x 7-11, 0-1-septate. On leaves of *Clematis ligusticifolia* Nutt. ex T. et G. Bates Creek, State Highway 487, about 12 miles southeast of State Highway 220, Natrona Co., WY, 14 Sept. 1969, alt. 5,000 ft. WGS & RS 6843.
1585. *HADROTRICHUM GLOBIFERUM* (Ell. et Ev.) J. J. Davis et *Phyllosticta ferax* Ell. et Ev. a) Conidiophores 24-35 x 5-7; conidia

- sphaerical, 11-16. b) Pycnidia 121-208, ostiole 20-34; conidia 3.5-5 x 1-1.5. On leaves of *Lupinus argenteus* Pursh. Tony Grove Lake, Cache Co., UT, 6 Aug. 1955. WGS & RS 4262.
1586. *HADOTRICHUM GLOBIFERUM* (Ell. et Ev.) J. J. Davis et *Phyllosticta ferox* Ell. et Ev. a) Conidiophores densely tufted, about 34 x 6-7; conidia 12-16 diam. b) Pycnidia 93-139; conidia 3.5-4.5 x 1. On leaves of *Lupinus parviflorus* Nutt. ex Hook. et Arn. Signal Mtn., Grand Teton Nat. Park, WY, 22 July 1955, alt. 7,150 ft. WGS & RS 4091.
1587. *OIDIUM AMBROSIAE* Thuem. On leaves of *Ambrosia confertifolia* DC. Host determined by C. T. Mason, Jr. Picture Rock Pass, west of Tucson, Pima Co., AZ, 1 Mar. 1973. WGS, RLG & GBC 7234.
1588. *OVULARIA MONOSPORIA* (West.) Pound et Clements. Conidiophores with several spore scars, 30-73 x 3.5-4.5; conidia clavate, 22-31 x 7.5-10. On leaves of *Rumex crispus* L. East of dead end of North Columbus Blvd., Tucson, Pima Co., AZ, 14 May 1968, alt. 2,300 ft. WGS & RS 6754.
1589. *OVULARIA MONOSPORIA* (West.) Pound et Clements. Conidiophores 44-90 x 3-4; conidia 13-42 x 5.5-11. On leaves of *Rumex hymenosepalus* Torr. Roadside, Oracle Road just north of junction with Tangerine Road, Pima Co., AZ, 7 Apr. 1968, alt. 2,500 ft. WGS & RS 6714.
1590. *RAMULARIA ADOXAE* (Rab.) Karst. Conidiophores 17-60 x 3.5-5; conidia 25-42 x 3-4, 0-1-3-septate. On leaves of *Adoxa moschatellina* L. Hidden Valley Lodge, Rocky Mtn. Nat. Park, CO, 1 July 1966. WGS & RS 6660.
1591. *RAMULARIA ARVENSIS* Sacc. Conidiophores 34-52 x 3.5, 1-septate; conidia 14-35 x 2.5-3, 0-1-2-septate. On leaves of *Potentilla norvegica* L. Host determined by R. L. Hartman. Swan Lake, Grand Teton Nat. Park, WY, 3 Aug. 1955, alt. 6,850 ft. WGS 4237.
1592. *RAMULARIA IONOPHILA* J. J. Davis. Conidiophores 17-35 x 3.5-4.5; conidia 20-42 x 3.5-4.5, 1-3-septate. On leaves of *Viola nuttallii* Pursh. Near Beaver Mtn. on Beaver Creek, Cache Nat. Forest, Wasatch Mts., Cache Co., UT, 28 June 1968. WGS & RS 6767.
1593. *RAMULARIA IONOPHILA* J. J. Davis. Conidiophores 30-83 x 3-4.5; conidia 20-53 x 3-4.5, 0-1-3-septate. On leaves of *Viola nuttallii* Pursh. var. *linguaeifolia* (Nutt.) Jepson. Howard Spring Camp, Targhee Nat. Forest, Fremont Co., ID, 11 July 1957, alt. 7,000 ft. WGS & RS 4982. First report for ID.
1594. *RAMULARIA PUNCTIFORMIS* (Schlecht.) Hoehn. Conidiophores 20-33 x 3-3.5; conidia 17-27 x 3.5-5. On leaves of *Epilobium angustifolium* L. Howard Spring Camp, Targhee Nat. Forest, Fremont Co., ID, 11 July 1957, alt. 7,000 ft. WGS & RS 4958.
1595. *RAMULARIA MENTHICOLA* Sacc. Conidiophores 20-40 x 3-3.5, 0-1-septate; conidia 17-37 x 3-4.5. On leaves of *Mentha arvensis* L. Four miles west of ID-WY State line, east of Ashton, Targhee Nat. Forest, Fremont Co., ID, 2 Aug. 1957, alt. 6,250 ft. WGS & RS 5270.
1596. *RAMULARIA SENOTINA* Ell. et Ev. Conidiophores 24-38 x 2.5-3.5; conidia 11-28 x 2.5-3, 0-1-septate. On leaves of *Solidago canadensis* L. Host determined by R. L. Hartman. Moose Ponds west of Moose, Grant Teton Nat. Park, WY, 2 Aug. 1955. WGS & RS 4227.
1597. *RAMULARIA SHELDONII* Trott. Conidiophores 20-60 x 3-3.5, 0-1-septate; conidia 15-41 x 3.5-5.5. On leaves of *Delphinium occidentale* (Wats.) Wats. Howard Spring Camp, Targhee Nat. Forest, Fremont Co., ID, 11 July 1957, alt. 7,000 ft. WGS & RS 4959.

1598. *RAMULARIA SILVESTRIS* Sacc. Conidiophores 18-40 x 2.2-3; conidia 14-37 x 2.2-3, 0-1-septate. On leaves of *Dipsacus silvestris* Mill. Birch Creek Canyon east of Smithfield, UT, 22 Aug. 1961, alt. 4,800 ft. WGS & RS 6104.
1599. *TORULA HERBARUM* Link ex Cda. Conidia 5-7 diam. On leaves of *Yucca* sp. Two miles south of Poncha Springs, off Highway 285, CO, 24 July 1970, alt. 7,400 ft. H. R. Simms sf-751. Determined by WGS.
1600. *TUBERCULINA PERSICINA* (Ditm.) Sacc. On *Puccinia aristidae* Tracy, on *Anemopsis californica* (Nutt.) H. et A. Ash Springs, Lincoln Co., NV, 20 Sept. 1965. P. D. Keener. Determined by WGS.

ADDENDUM

Dr. Solheim died in May, 1978 (Mycologia 71, 1979). Centum XVI and Centum XVII have been edited for publication by Martha Christensen, R. L. Gilbertson and G. B. Cummins. We consider that Dr. Solheim contributed more to mycological knowledge of the Rocky Mountain region than any other individual. Mycoflora Saximontanensis Exsiccata serves as a fitting memorial to his life's work.

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MYCOFLORA SAXIMONTANENSIS EXSICCATA CENTUM XVII¹

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The rusts which make up the seventeenth century of Rocky Mountain Fungi are distributed as follows: Canada 2, Montana 5, Wyoming 42, Colorado 13, Utah 3 and Arizona 35.

Five of the collections were made by Ernest P. Walker, Assistant Director, National Zoological Park, Smithsonian Institution, 1930-56. From 1911-13 Walker made a survey of the birds of Wyoming and was an assistant in the zoological laboratory at Wyoming. During parts of 1912-13 he did some botanical collecting in Colorado and Utah. These collections were deposited in the Rocky Mountain Herbarium from where distributions of duplicates were made. State abbreviations are those of the U.S. Postal Service. Names of some collectors are abbreviated as follows: George B. Cummins, GBC; Robert L. Gilbertson, RLG; Ragnhild Solheim, RS; Wilhelm G. Solheim, WGS.

1601. *CHRYSOMYXA ARCTOSTAPHYLI* Diet. III. On *Arctostaphylos uva-ursi* (L.) Spreng. Ridge above University of Wyoming Science Camp, near Solheim Lake, Medicine Bow Mts., Albany Co., WY, 29 June 1939, alt. 10,500 ft. WGS 1646.
1602. *CHRYSOMYXA LEDICOLA* Lagh. II. On *Ledum groenlandicum* Oeder. Athabasca River Highway 93 at Mt. Christie Sign, Jasper Nat. Park, Canada, 25 June 1971, alt. 4,350 ft. WGS & RS 7068.
1603. *CHRYSOMYXA PIROLATA* Wint. III. On *Pyrola asarifolia* Michx. N. W. drainage from Pole Mt., above junction with Pole Creek, Laramie Mts., Albany Co., WY, 31 May 1974, alt. 8,300 ft. WGS 7382.
1604. *CHRYSOMYXA PIROLATA* Wint. On *Pyrola chlorantha* Swartz. Libby Creek Picnic Grounds on old road, Medicine Bow Mts., Albany Co. WY, 25 July 1973. WGS, WGS II & RS 7284.
1605. *COLEOSPORIUM VIGUIERAE* Diet. et Holw. I. On *Viguiera dentata* (Cav.) Spreng. var. *dentata*. Rest Park on Highway 82 west of Patagonia, Santa Cruz Co., AZ, 2 Dec. 1966. WGS, C. T. Mason, Jr. &

¹/ Contribution from the Department of Botany and the Rocky Mountain Herbarium of the University of Wyoming and from the University of Arizona Agricultural Experiment Station.

²/ Deceased May 15, 1978.

- W. S. Phillips 6551. This fungus is common in the mountains of southeastern Arizona and is known also from southern New Mexico, the Big Bend region of Texas and Sonora, Mexico. It is macrocyclic and autoecious.
1606. *MELAMPSORA EPITEA* Thuem. II. On *Salix*. Near Dave Johnson Power Plant, Glenrock, Converse Co., WY, 1 Aug. 1973. WGS & RS 7312.
1607. *MELAMPSORA EPITEA* Thuem. II. On *Salix scouleriana* Barratt. Carr Peak Trail, Huachuca Mts., Cochise Co., AZ, 12 Oct. 1973, alt. about 8,800 ft. GBC 73-124.
1608. *MELAMPSORA EPITEA* Thuem. II, III. On *Salix geyeriana* Anders. Friend Creek, west base of Laramie Peak, Albany Co., WY, 25 Sept. 1974, alt. 7,700 ft. WGS & Fred Hermann 7420.
1609. *MELAMPSORA LINI* (Ehrenb.) Lév. On *Linum lewisii* Pursh. Moab Valley, UT, 20 July 1912. Ernest P. Walker 345.
1610. *MELAMPSORA MEDUSAE* Thuem. II, III. On *Populus tremuloides* Michx. Fly Peak near Crest Trail, Chiricahua Mts., Cochise Co., AZ, 13 Sept. 1973. GBC 73-115. We follow Ziller (Can. For. Service Publ. No. 1329:144-147. 1974) in treating *M. albertensis* Arth. as a synonym of *M. medusae*.
1611. *MELAMPSORA PARADOXA* Diet. et Holw. On *Salix bebbiana* Sarg. Near Caribou Resort, Crazy Woman Creek, Big Horn Mts., WY, 27 July 1965. GBC 65-24.
1612. *MELAMPSORA PARADOXA* Diet. et Holw. On *Salix myrtillofolia* Anders. Sierra Madre Mts., Carbon Co., WY, 9 Sept. 1971. WGS & RS 7146.
1613. *MELAMPSORA PARADOXA* Diet. et Holw. II, III. On *Salix lutea* Nutt. Four miles above Highway 230 at base of west slope of Sheep Mt., Medicine Bow Mts., Albany Co., WY, 13 Sept. 1973. WGS & RS 7373.
1614. *PUCCINIASTRUM EPILOBII* Otth II. On *Epilobium adenocaulon* Hausskn. Red Rock Ranch Motel, 2.5 miles east of Dubois, Fremont Co., WY, 28 Aug. 1961, alt. 6,900 ft. WGS & RS 6150.
1615. *PUCCINIASTRUM GOEPPERTIANUM* (Kuehn) Kleb. III. On *Vaccinium caespitosum* Michx. Between Albany and Keystone, Medicine Bow Mts., WY, 27 July 1973. WGS, WGS II & RS 7298.
1616. *PUCCINIASTRUM PYROLAE* Arth. II. On *Pyrola virens* Schweigg. N. W. Drainage from Pole Mt. into Pole Creek below Yellow Pine Camp Ground, Laramie Mts., Albany Co., WY, 12 June 1974. WGS 7385.
1617. *UREDINOPSIS PTERIDIS* Diet. et Holw. II. On *Pteridium aquilinum* (L.) Kuhn var. *pubescens* Underw. Kehl Springs, Coconino Nat. Forest, Coconino Co., AZ, 21 Aug. 1973. RLG 11139.
1618. *CUMMINSIELLA MIRABILISSIMA* (Peck) Nannf. II. On *Berberis repens* Lindl. Apolinaris Spring Picnic Ground, Yellowstone Nat. Park, WY, 13 Sept. 1969, WGS & RS 6839.
1619. *CUMMINSIELLA MIRABILISSIMA* (Peck) Nannf. II, III. On *Berberis repens* Lindl. Highways 3 and 93, 3 miles north of Jaffery, BC, Canadian Rockies, Canada, 26 June 1971, alt. 2,800 ft. WGS & RS 7070.
1620. *CUMMINSIELLA MIRABILISSIMA* (Peck) Nannf. II, III. On *Berberis repens* Lindl. Canyon southwest of Aspen Spring Canyon, Lukachukai-Chuska Mt. Range, Navajo Indian Reservation, AZ, 8 June 1967. C. T. Mason, Jr., WGS & R. H. Hevley 2696.
1621. *GYMNOSPORANGIUM KERNIANUM* Bethel III. On *Juniperus deppeana* Steud. Molino Basin, Santa Catalina Mts., Pima Co., AZ, 23 Mar. 1973. RLG 10945. This species occurs in other mountains of southeastern AZ, but no aecial stage has been found. In fact, species of *Amelanchier* are not known in the area.
1622. *GYMNOSPORANGIUM NIDUS-AVIS* Thaxt. III. On *Amelanchier alni-*

- folia* Nutt. Norwood Hill, San Miguel Co., CO, 16 Aug. 1912. Ernest P. Walker 467.
1623. *NYSSOPSORA CLAVELLOSA* (Berk.) Arth. III. On *Aralia racemosa* L. Upper Carr Canyon, Huachuca Mts., Cochise Co., AZ, 3 Oct. 1975. GBC 75-46. This is the only locality in the Southwest where this rust fungus has been found. It was first collected in 1909 by L. N. Gooding who contributed many records of southwestern species.
1624. *NYSSOPSORA ECHINATA* (Lév.) Arth. III. On *Ligusticum porteri* C. et R. Road west of Flag Ranch, between Grand Teton and Yellowstone Nat. Parks, Teton Co., WY, 14 July 1956. WGS & RS 4569.
1625. *PHRAGMIDIUM FUSIFORME* Schroet. I, II. On *Rosa acicularis* Lindl. Bear Dance Picnic Grounds, Flathead Nat. Forest, MT, 27 June 1971, alt. 3,000 ft. WGS & RS 7072.
1626. *PHRAGMIDIUM FUSIFORME* Schroet. II, III. On *Rosa acicularis* Lindl. Road Camp at glacial moraine, Libby Creek above Centennial, Medicine Bow Mts., Albany Co., WY, 30 Aug. 1956. WGS & RS 4664.
1627. *PHRAGMIDIUM IVESIAE* Syd. III. On *Potentilla gracilis* Dougl. ex Hook. ssp. *muttallii* (Lehm.) Keck. South Crow Creek, Laramie Mts., Albany Co., WY, 23 Aug. 1971. WGS & WGS II 7110.
1628. *PHRAGMIDIUM MONTIVAGUM* Arth. O, I. On *Rosa woodsii* Lindl. Pass Creek, 3.7 miles north of WY border on Highway 87, MT, 18 June 1971. WGS & RS 7064.
1629. *PHRAGMIDIUM MONTIVAGUM* Arth. I, II, III. On *Rosa acicularis* Lindl. Schwin Conference Camp Road, Dubois, Fremont Co, WY, 8 Aug. 1969, alt. 6,600 ft. WGS & RS 6811.
1630. *PHRAGMIDIUM RUBI-IDAET* (DC.) Karst. I. On *Rubus idaeus* L. var. *sachalinensis* (Levl.) Focke. Happy Jack Picnic Area, Laramie Mts., Albany Co., WY, 7 July 1960, alt. 8,200 ft. WGS 5798.
1631. *PUCCINIA ABRUPTA* Diet. et Holw. var. *abrupta* III et *Coleosporium viguierae* Diet. et Holw. I. On *Viguiera dentata* (Cav.) Spreng. var. *lanceifolia* Blake. Rest Park on Highway 82, west of Patagonia, Santa Cruz Co., AZ, 2 Dec. 1966. WGS, C. T. Mason, Jr. & W. S. Phillips 6550.
1632. *PUCCINIA ACROPHILA* Peck III. On *Synthyris pinnatifida* S. Wats. var. *pinnatifida*. Mountain north of Teton Pass, southwest of Jackson, WY, 5 Sept. 1960. GBC 60-126.
1633. *PUCCINIA ANGUSTATA* Peck O, I. On *Mentha arvensis* L. Middle Crow Creek, Laramie Mts., Albany Co., WY, 16 Aug. 1962. WGS & RS 6268.
1634. *PUCCINIA BRACHYPODII* Oth var. *poae-nemoralis* (Oth) Cumm. et Greene II. On *Poa interior* Rydb. Maroon Creek Trail, one mile from Wilderness Portal, south of Aspen, CO, 21 July 1975. GBC 75-31.
1635. *PUCCINIA CALOCHORTI* Peck III. On *Calochortus gummisonii* Wats. About one mile down on Crow Creek, from road between Vedaauwo and Happy Jack Road, Laramie Mts., Albany Co., WY, 5 July 1974. WGS, RS & Nancy Hermann 7405.
1636. *PUCCINIA CARICINA* DC. O, I. On *Ribes setosum* Lindl. University of Wyoming Camp at Trail Lake Ranch, Dubois, Fremont Co., WY, 8 Aug. 1969, alt. 7,500 ft. WGS & RS 6809.
1637. *PUCCINIA CARICINA* DC. II, III. On *Carex aquatilis* Wahl. University of Wyoming Camp at Trail Lake Ranch, Dubois, Fremont Co., WY, 29 Aug. 1961, alt. 7,700 ft. WGS & RS 6170.
1638. *PUCCINIA CARICINA* DC. II, III. On *Carex nebraskensis* Dewey. At Springs on Happy Jack Road, 28 miles west of Cheyenne, Medicine Bow Nat. Forest, Albany Co., WY, 17 Sept. 1969, alt. 7,850 ft. WGS & RS 6848.

1639. *PUCCINIA CONOCLINII* Seym. II, III. On *Eupatorium pycnocephalum* Less. Sycamore Canyon, Santa Cruz Co., AZ, 24 Sept. 1975. GBC 75-45.
1640. *PUCCINIA CRANDALLII* Pamm. et Hume O. On *Symphoricarpos albus* (L.) Blake. Bear Dance Picnic Grounds, Flathead Nat. Forest, MT, 27 June 1971, alt. 3,000 ft. WGS & RS 7071.
1641. *PUCCINIA CRANDALLII* Pamm. et Hume O, I. On *Symphoricarpos albus* (L.) Blake. Crow Creek, below road from Vedaauwo to Happy Jack Road, Laramie Mts., Albany Co., WY, 17 June 1974, alt. 7,800 ft. WGS 7393.
1642. *PUCCINIA CRANDALLII* Pamm. et Hume II. On *Poa fendleriana* (Steud.) Vasey ? (? shade form). Shady ledges, upper Carr Canyon, Huachuca Mts., Cochise Co., AZ, 3 Oct. 1975. GBC 75-48. The aecial stage occurs on Carr Peak Trail but was not seen here.
1643. *PUCCINIA DIOICAE* Magn. O, I. On *Aster foliaceus* Lindl. ex DC. var. *canbyi* A. Gray. Libby Creek Picnic Grounds on old road, Medicine Bow Mts., Albany Co., WY, 12 Aug. 1970, alt. 8,500 ft. WGS 6993.
1644. *PUCCINIA DISTORTA* Holw. III. On *Hyptis emoryi* Torr. Near upper end of Apache Lake, Salt River, Maricopa Co., AZ, 24 Oct. 1975. GBC 75-49. This species, which is common in Mexico, was collected previously in Arizona by L. N. Goodding in 1920 in the Estrella Mts., also in Maricopa Co., near Phoenix.
1645. *PUCCINIA DURANGENSIS* Cumms. II, III. On *Stipa pringlei* Scribn. Near upper end of Carr Canyon Road, Huachuca Mts., Cochise Co., AZ, 3 Oct. 1975. GBC 75-47. This and a collection of *Piptochaetium fimbriatum* (H.B.K.) Hitchc. from the Chiricahua Mts. of Cochise Co. are the known records for the U.S. It was described and is otherwise known (Cummins, The Rust Fungi of Cereals, Grasses and Bamboos. p. 380. Springer-Verlag. 1971) from Durango State, Mexico on *P. fimbriatum*.
1646. *PUCCINIA ENCELIAE* Diet. et Holw. var. *aemulans* (Syd.) Parmelee. On *Viguiera multiflora* (Nutt.) Blake. Norwood Hill, San Miguel Co., CO, 16 Aug. 1912. Ernest P. Walker 472.
1647. *PUCCINIA FRANSERIAE* Syd. II. On *Hymenoclea monogyra* Torr. et Gray. Tangerine Road, north of Tucson, Pima Co., AZ, 13 Mar. 1970. WGS & RLG 6852.
1648. *PUCCINIA FRANSERIAE* Syd. II, III. On *Hymenoclea pentalepis* Rydb. Tangerine Road, north of Tucson, Pima Co., AZ, 13 Mar. 1970. WGS & RLG 6853.
1649. *PUCCINIA FRANSERIAE* Syd. II, III. On *Ambrosia (Franseria) deltoidea* (Torr.) Payne. Tucson Mt. Park, Pima Co., AZ, 25 Apr. 1968. WGS & A. Johnston 6737. We follow Cummins (Mycologia 67:175. 1975) in separating *P. franseriae* from *P. splendens* Vize.
1650. *PUCCINIA FRASERI* Arth. On *Hieracium albiflorum* Hook. Ross Creek Trail, 1 mile from Rising Sun Camp Ground, Glacier Nat. Park, MT, 12 Aug. 1974. GBC 74-12.
1651. *PUCCINIA GIGANTISPORA* Bubák I, III. On *Anemone multifida* Poir. About 1 mile below road from Vedaauwo to Happy Jack Road on Crow Creek, Laramie Mts., Albany Co., WY, 5 July 1974. WGS & RS 7408.
1652. *PUCCINIA GLOBOSIPES* Peck. On *Lycium fremontii* Gray. Sandario Road, west of Tucson, AZ, 1 Mar. 1973. WGS 7228.
1653. *PUCCINIA GRAMINIS* Pers. II. On *Phleum pratense* L. Roadside south of Bozeman, MT, 8 Sept. 1960. WGS & RS 5817.
1654. *PUCCINIA GRINDELIAE* Peck O. (1), III. On *Baileya multiradiata* Harv. et Gray. Saguaro Nat. Monument east of Tucson, Pima Co., AZ,

- 17 Apr. 1973. GBC 73-59. This is the first rust fungus recorded on *Baileya*. In early season, aecia and uredinia are produced on *Baileya* and *Psilostrophe* but are soon masked by telia.
1655. *PUCCINIA GRINDELIAE* Peck III. On *Haplopappus spinulosus* (Pursh) DC. Santa Catalina Foothills, north of end of North Campbell Ave., Tucson, Pima Co., AZ, 15 Feb. 1973. WGS, GBC & RLG 7207.
1656. *PUCCINIA GRINDELIAE* Peck III. On *Erigeron eatonii* Gray. Morton Pass, State Highway 34, Laramie Mts., Albany Co., WY, 8 July 1971, alt. 7,200 ft. WGS & RS 7081.
1657. *PUCCINIA GRINDELIAE* Peck III. On *Erigeron nematophyllus* Rydb. Laramie Mts., between City Reservoir and Pilot Knob, Albany Co., WY, 3 Aug. 1969. WGS & RS 6806.
1658. *PUCCINIA GRINDELIAE* Peck III. On *Gutierrezia sarothrae* (Pursh) Britt. Morton Pass, State Highway 34, Laramie Mts., Albany Co., WY, 8 July 1971, alt. 7,100 ft. WGS & RS 7082.
1659. *PUCCINIA GRINDELIAE* Peck III. On *Psilostrophe cooperi* (Gray) Greene. Santa Catalina Foothills, north of end of North Campbell Ave., Tucson, Pima Co., AZ, 15 Feb. 1973. WGS, GBC & RLG 7205.
1660. *PUCCINIA HELIANTHELLAE* Arth. O, I, II, III. On *Helianthella quinquenervis* (Hook.) Gray. Hillside near Lizard Point, Grand Teton Nat. Park, WY, 15 Aug. 1971. John Baxter.
1661. *PUCCINIA HEUCHERAE* (Schw.) Diet. var. *austroberingiana* Savile III. On *Saxifraga arguta* D. Don. Paint Brush Canyon, Grand Teton Nat. Park, WY, 18 Aug. 1960. GBC 60-40.
1662. *PUCCINIA HIERACII* (Roehling) Mart. II, III. On *Crepis acuminata* Nutt. Hunter Creek, 2.5 miles northeast of Aspen, CO, 11 Aug. 1975. GBC 75-16.
1663. *PUCCINIA HIERACII* (Roehling) Mart. II, III. On *Lygodesmia juncea* (Pursh) D. Don. Wheatland Cutoff, State Highway 34, Laramie Mts., Albany Co., WY, 30 Sept. 1956, alt. 6,100 ft. WGS & RS 4668.
1664. *PUCCINIA HYDROPHYLLI* Peck et G. W. Clint. ssp. *mertensiae* (Peck) Hennen III. On *Mertensia ciliata* (James) D. Don. Silver Lake Camp Ground, Medicine Bow Mts., Carbon Co., WY, 15 Aug. 1969. WGS & RS 6817.
1665. *PUCCINIA INANIPES* Diet. et Holw. O, I, II, III. On *Eupatorium solidaginifolium* Gray. Rucker Canyon Lake, Chiricahua Mts., Cochise Co., AZ, 14 Sept. 1973. GBC & RLG 73-123.
1666. *PUCCINIA LASCHII* Lagerh. II. On *Cirsium*. Highway 82, 4 miles southwest of Sonoita, Santa Cruz Co., AZ, 14 May 1968, alt. 4,500 ft. WGS & RS 6752. *Puccinia cirsii* Lasch, 1859, under which this fungus has passed, is antedated by *P. cirsii* Kirch., 1856 (see Savile, Can. J. Bot. 48:1574-1576. 1970). *P. laschii* sometimes is treated as a synonym of *P. calcitrapae* DC.
1667. *PUCCINIA LIGUSTICI* Ell. et Ev. III. On *Oxyopolis fendleri* (Gray) Heller. About 2.5 miles east on East Maroon Creek Trail, south of Aspen, CO, 21 July 1975. GBC 75-15.
1668. *PUCCINIA MINUSSENSIS* Thuem. O, I, II, III. On *Lactuca pulchella* (Pursh) DC. Muddy Gap, Carbon Co., WY, 29 June 1971, alt. 6,000 ft. WGS & RS 7079.
1669. *PUCCINIA MONOICA* Arth. On *Thlaspi montanum* L. Along semi-open Ute Trail through spruce-lodgepole pine woods south of Lake Irene, Rocky Mountain Nat. Park, CO, 9 July 1975, alt. 10,400 ft. F. J. Hermann.
1670. *PUCCINIA OENOTHERAE* Vize II, III. On *Camissonia californica* (Nutt. ex Torr. et Gray) Raven. Along highway, Santa Catalina Mts., Pima Co., AZ, 12 Apr. 1968, alt. 3,600 ft. WGS, RS & RLG 6734.

1671. *PUCCINIA PALLIDISSIMA* Speg. On *Stachys coccinea* Jacq. Sycamore Canyon, Santa Cruz Co., AZ, 24 Sept. 1975. GBC 75-40.
1672. *PUCCINIA PENSTEMONIS* Peck III. On *Penstemon pinifolius* Greene. Crest Trail, near boundary to Wilderness Area, Chiricahua Mts., AZ, 24 Oct. 1974. GBC 74-27. This is a new host for the rust.
1673. *PUCCINIA POARUM* Niels. O, I. On *Helenium hoopesii* A. Gray. Dark Canyon, UT, 18 July 1912, alt. 9,500 ft. Ernest P. Walker 308.
1674. *PUCCINIA PUNCTIFORMIS* (Strauss) Roehling O, I. On *Cirsium arvense* (L.) Scop. About 3.7 miles east of reservoir on County Highway 12, Laramie Mts., Albany Co., WY, 13 July 1971. WGS & RS 7093.
1675. *PUCCINIA RECONDITA* Rob. ex Desm. O, I. On *Clematis ligusticifolia* Nutt. Two miles south of Poncho Springs, CO, off Highway 285, in sage-juniper association, 24 July 1970. Horace R. Simms Sf-750.
1676. *PUCCINIA RECONDITA* Rob. ex Desm. O, I. On *Delphinium*. Sixteen miles east of Carr, CO, 18 July 1970. H. R. Simms, S. Shushan and R. Fogel, Sf-10,001.
1677. *PUCCINIA RECONDITA* Rob. ex Desm. O, I. On *Hydrophyllum capitatum* Dougl. ex Benth. To left of Pilgrim Creek, at base of ridge, Grand Teton Nat. Park, WY, 1 July 1956, alt. 6,850 ft. WGS & RS 4478.
1678. *PUCCINIA RECONDITA* Rob. ex Desm. II, III. On *Agropyron cf. spicatum* (Pursh) Scribn. Section 32, Weld Co., CO, 18 July 1970. H. R. Simms, S. Shushan & R. Fogel Sf-10,004.
1679. *PUCCINIA SENECTIONIS* Lib. I, III. On *Senecio crassullus* A. Gray. Lost Man Lake Trail, 1.5 miles from Lost Man Camp Ground, east of Aspen, CO, 29 July 1975. GBC 75-17.
1680. *PUCCINIA STIPAE* Arth. O, I. On *Chrysothamnus viscidiflorus* (Hook.) Nutt. ssp. *lanceolatus* (Nutt.) Hall et Clements. Happy Jack Road, east of Pole Mt., Laramie Mts., Albany Co., WY, 7 July 1960, alt. 8,200 ft. WGS & RS 5801.
1681. *PUCCINIA SUBDECORA* Syd. et Holw. On *Brickellia grandiflora* (Hook.) Nutt. Cascade Canyon, Grand Teton Nat. Park, WY, 12 Aug. 1971. John Baxter.
1682. *PUCCINIA TETRAMERII* Seym. On *Tetramerium hispidum* Nees. Sycamore Canyon, Santa Cruz Co., AZ, 24 Sept. 1975. GBC 75-44.
1683. *PUCCINIA VERATRI* Duby II, III. On *Veratrum californicum* Durand. Four miles up Hunter Creek, Northeast of Aspen, CO, 11 Aug. 1975. GBC 75-14.
1684. *PUCCINIA XANTHII* Schw. On *Ambrosia (Franseria) confertifolia* (DC.) Rydb. This is the first record of this rust on this host. East end of North Columbus Blvd., Tucson, Pima Co., AZ, 14 May 1968. WGS 6755.
1685. *PUCCINIA XANTHII* Schw. III. On *Ambrosia psilostachya* DC. North Columbus Blvd., Tucson, Pima Co., AZ, 4 May 1968. WGS & RS 6738.
1686. *RAVENELIA RETICULATAE* Long II, III. On *Calliandra reticulata* Gray. Gardner Canyon, east side of Santa Rita Mts., Coronado Nat. Forest, Pima Co., AZ, 11 Sept. 1975. GBC 75-34.
1687. *TRANZSCHELIA COHAESA* (Long) Arth. O, I. On *Anemone tuberosa* Rydb. Picture Rock Pass, Tucson, AZ, 1 Mar. 1973. WGS, GBC & RLG 7229.
1688. *TRANZSCHELIA COHAESA* (Long) Arth. O, I, II, III. On *Anemone tuberosa* Rydb. Near Rocking K Ranch, Colossal Cave Road, east of Tucson, AZ, 22 Mar. 1973. GBC 73-33.
1689. *TRANZSCHELIA COHAESA* (Long) Arth. On *Anemone tuberosa* Rydb.

- Molino Basin, Santa Catalina Mts., Tucson, AZ, 5 Feb. 1973. GBC 73-9. We follow Cummins (Mycologia 67:176. 1975) in considering that *T. tucsonensis* (Arth.) Diet. is a synonym of *T. cohaesa*.
1690. *UROMYCES GLICYRRHIZAE* Magn. O, I. On *Glycyrrhiza lepidota* Pursh. Geyser Basin, UT, 30 July 1912. Ernest P. Walker 370. This is the uredinoid aecial form.
1691. *UROMYCES INTRICATUS* Cooke O, I. On *Eriogonum brevicaule* Nutt. About 1.4 miles north of bridge on Little Medicine Bow River, 5 miles north of Medicine Bow, WY, State Highway 487, 2 July 1967, alt. 7,000 ft. WGS & RS 6591.
1692. *UROMYCES JONESII* Peck III. On *Ranunculus alismaefolius* Geyer ex Benth. Between Albany and Keystone, Medicine Bow Mts., Albany Co., WY, 27 July 1973. WGS, WGS II & RS 7306.
1693. *UROMYCES JUNCI-EFFUSI* P. et H. Syd. II. On *Juncus sarimontanensis* A. Nels. f. *brunescens* (Rydb.) Hermann. Cypress Camp Ground, Rucker Canyon, Chiricahua Mts., Cochise Co., AZ, 14 Sept. 1973. GBC 73-120.
1694. *UROMYCES MEXICANUS* Diet. et Holw. III. On *Desmodium rosei* Schubert. Gardner Canyon, east side of Santa Rita Mts., Coronado Nat. Forest, Pima Co., AZ, 11 Sept. 1975. GBC 75-33.
1695. *UROMYCES MEXICANUS* Diet. et Holw. III. On *Desmodium procumbens* (Mill.) A. S. Hitchc. Rucker Canyon, Chiricahua Mts., Cochise Co., AZ, 17 Nov. 1961. GBC 61-479.
1696. *UROMYCES MINOR* Schroet. I, III. On *Trifolium parryi* Gray. Lost Man Lake Trail, 2 miles from Lost Man Camp Ground, east of Aspen, CO, 7 Aug. 1975. GBC 75-29.
1697. *UROMYCES PSORALEAE* Peck. On *Psoralea lanceolata* Pursh. Nine miles northeast of Nunn, Weld Co., CO, 28 July 1970. H. R. Simms, S. Shushan & R. Fogel Sf-10,003.
1698. *UROMYCES PSORALEAE* Peck O, I. On *Psoralea lanceolata* Pursh. About 2.5 miles south of Burns, Laramie Co., WY, 17 June 1960, alt. 5,400 ft. WGS 5794.
1699. *UROMYCES PUNCTATUS* Schroet. II. On *Astragalus lentiginosus* Dougl. Tangerine Road about 1/2 mile from Oracle Road, Tucson, AZ, 7 Apr. 1968, alt. 2,700 ft. WGS & RS 6717.
1700. *UROMYCES VICIAE-FABAE* (Pers.) Schroet. O, I, II, III. On *Lathyrus leucanthus* Rydb. South Brush Creek Camp Ground, Medicine Bow Mts., Carbon Co., WY, 6 Aug. 1968. WGS & J. McHenry 6783.

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NOTES ON HYPHOMYCETES XXX. ON THREE SPECIES OF *IDRIELLA*.

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ABSTRACT

Idriella angustispora Morgan-Jones and *I. bambusae* Morgan-Jones, two new species of *Idriella* Nelson and Wilhelm, are described, illustrated, and compared with other species of the genus. *Idriella variabilis* Matsushima is described and illustrated from a collection made in Alabama.

INTRODUCTION

The generic name *Idriella* Nelson and Wilhelm was established for a single species, *I. lunata*, isolated from a root rot of strawberry. The fungus was recognized as the causal organism of this disease for which black, sunken lesions are symptomatic (Nelson and Wilhelm, 1956). The genus is characterized by possession of polyblastic, sympodial, pigmented, denticulate conidiogenous cells bearing hyaline, lunate or falcate conidia. *Idriella lunata* also produces a chlamydospore state to which Ellis (1971) applied the name *Trichocladium*.

The genus remained monotypic until Ram (1970) and Vittal (1970) each added one species to it. *Idriella couratarii* Ram was described from isolates derived from wood samples of *Couratari* sp. in Brazil whilst *I. vandalorensis* Vittal was collected in leaf litter of *Capparis* sp. in India. Both species have similar characteristics to *I. lunata* differing only in a few details, perhaps the most important of which is conidium length. The presence of a single transverse septum in the conidium of *I. vandalorensis* and possession of septate conidiophores were cited as distinguishing characteristics of this species. In addition no chlamydospores were described. *I. couratarii* was described as having intercalary chlamydospores borne in irregular chains. These are not identifiable with the genus *Trichocladium* Harz.

Matsushima (1971a, 1971b) enlarged the genus *Idriella* further by the addition of three species collected in New Guinea. These are *I. mycogonoidea* and *I. variabilis*, isolated from garden and woodland soils respectively, and *I. ramosa*, collected on rotten leaves of an unnamed broad-leaved tree and grown on sterilized leaves of *Musa paradisiaca*. The specific epithet *mycogonoidea* was derived from the fact that the chlamydospores of this taxon are similar to those characteristic of the genus *Mycogone* Link. The chlamydospores of *I. ramosa* and *I. variabilis*, however, resemble those figured by Ram for *I. couratarii*.

Kimbrough and Atkinson (1972) discovered a connection between the discomycete *Hymenoscyphus caudatus* (Karsten) Dennis and an *Idriella* sp. Cultures grown from single ascospores of the former produced a conidial state closely similar to *I. couratarii* and *I. variabilis*.

A sixth species, *I. desertorum*, isolated from desert soil from Egypt, was added subsequently by Nicot and Mouchacca (1972). This produces chlamydospores resembling those of *I. lunata*. Some further account of the cultural characteristics of *I. desertorum* was provided by Gol (1972).

Sutton et al (1972) in a study of *Microdochium* Sydow, to which three species were added, noted the similarities between this genus and *Idriella*. A possible merger of these two genera together with *Chloridiella* Arnaud, whose common characteristics with *Idriella* had been pointed out earlier by Nicot and Charpentie (1971), was suggested. Judgment on the advisability of considering them synonymous was, however, reserved until such time as more details of behaviour in culture and on natural substrata are available. *Arxiella lunata* Ruscoe was recognized to be incorrectly classified in *Arxiella* Papendorf and to be more appropriately placed in *Idriella*. To avoid creating a later homonym of *Idriella lunata* Nelson and Wilhelm by transfer of Ruscoe's binomial a new name, *I. australiensis*, was proposed for this taxon, this becoming the seventh species of *Idriella* published.

Mouchacca and Samson (1973) subscribed to the view that *Microdochium* and *Idriella* should be maintained as separate genera when they added two new species to the former.

Matsushima (1975) reported that *I. variabilis* is indistinguishable in pure culture from *Circinotrichum fertile* Pirozynski and Hodges. *C. fertile* was transferred into *Idriella* as *I. fertilis* and *I. variabilis* listed as a synonym in spite of the fact that the latter name, published in 1971, predates *C. fertile* by two years. In the same publication Matsushima described and illustrated three additional *Idriella* species but without applying any specific epithets to them. One of these (MFC -4867) was noted as being similar to *Microdochium caespitosum* Sutton, Pirozynski and Deighton. Sutton et al (1972) had previously drawn attention to a similarity between *M. caespitosum* and *I. vandalurensis*

although the condium length measurements given for his collection (20 - 30 μ) differ from those given in the type description of this species (13 - 23 μ).

During the course of an investigation of leaf litter fungi associated with *Quercus nigra* L. and *Bambusa* sp. in Alabama a number of collections assignable to *Idriella* have been obtained. There are two taxa among these which differ significantly from the species of this genus described hitherto. New names for them are established herein. Another is identified as *I. variabilis*.

TAXONOMIC PART

Idriella angustispora sp. nov. (Fig. 1)

Coloniae effusae, brunneae, pilosae. Mycelium partim superficiale, partim in substrato immersum, ex hyphis ramosis, septatis, hyalinis vel pallide brunneis, laevibus, 1.5 - 4 μ crassis compositum. Chlamydosporae terminales vel intercalares, plerumque catenatae, aggregatae, abundantes, globosae, ovoideae vel ellipsoideae, crassi tunicatae, leviae, brunneae. Conidiophora macronemata, aggregata, ex chlamydospora et hyphis repentibus oriunda, stipite principali non ramoso, cylindrica, erecta, recta, brunnea vel pallide brunnea, apicem versus subhyalina, septata, usque ad 48 μ longa, 3 - 4 μ crassa. Cellulae conidiogae holoblasticae, discretae, sympodiales vel synchronicae, subhyalina vel hyalina, cylindrica vel ampulliformes, usque ad 15 μ longae, 2 - 3 μ crassae; apex nodosus. Conidia sicca, acropleurogena, falcata, continua, hyalina, laevia, 29 - 32 X 1 - 1.5 μ .

In foliis dejectis *Quercus nigrae*, Auburn University, Lee County, Alabama, May 18, 1978. R. C. Sinclair, AUA, holotypus.

Colonies effuse, brown, hairy. Mycelium partly superficial, partly immersed in the substratum, composed of branched, septate, hyaline to pale brown, smooth, 1.5 - 4 μ wide hyphae. Chlamydospores terminal or intercalary, frequently in chains, crowded, abundant, globose, ovoid or ellipsoid, thick-walled, smooth, brown. Conidiophores macronematous, mononematous, crowded, arising from the chlamydospores or from superficial repent hyphae, main stipe unbranched, cylindrical, erect, straight, pale brown to brown, subhyaline towards the apex, septate, up to 40 μ long, 3 - 4 μ wide. Conidiogenous cells holoblastic, discrete, in groups of three or four at the tip of the conidiophore stipe, sympodial or synchronous, cylindrical to ampulliform, up to 15 μ long, 2 - 3 μ wide; apex nodose. Conidia dry, acropleurogenous, falcate, continuous, hyaline, smooth, 29 - 32 X 1 - 1.5 μ .

On fallen leaves of *Quercus nigra* L.; N. America.

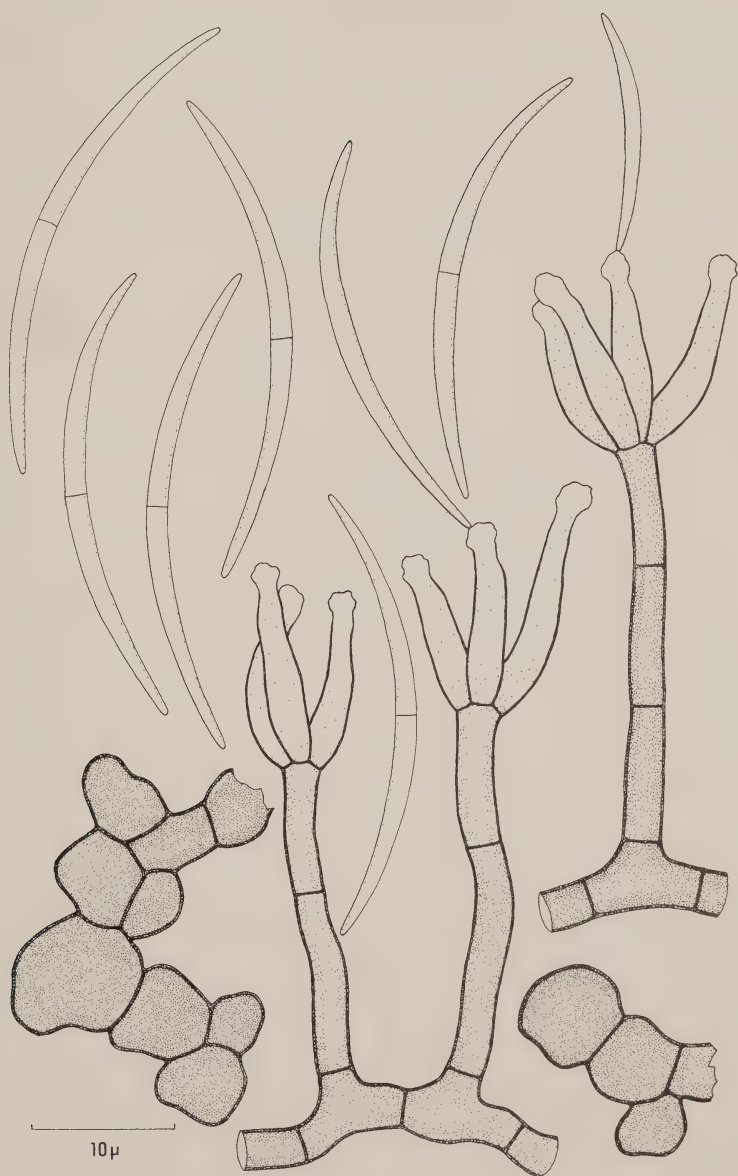


FIGURE 1. *Idriella angustispora*

Specimen examined: on *Q. nigra*, Auburn University, Lee County, Alabama, May 18, 1978, R. C. Sinclair.

I. angustispora differs from *I. ramosa*, a morphologically similar species, in several respects. Its conidia have a greater uniformity of size and, although falling within the length range of *I. ramosa*, are appreciably narrower. Furthermore the conidiophores of *I. angustifolia* have an unbranched main stipe bearing a single terminal whorl of a few conidiogenous cells, quite different from the abundantly branched conidiophores of *I. ramosa*.

Idriella bambusae sp. nov. (Fig. 2).

Coloniae effusae, fuscae vel atrae. Mycelium partim superficiale, partim in substrato immersum, ex hyphis ramosis, hyalinis vel pallide brunneis, laevibus, 2 - 4 μ crassis compositum. Stroma plectenchymatum ex cellulis pallide brunneis vel brunneis compositum. Chlamydosporae terminales vel intercalares, plerumque catenatae, ovoideae vel ellipsoideae, crassitunicatae, leviae, brunneae. Conidiophora macronemata, mononemata, ex stroma et hyphis repentibus singulatim vel in caespitulos pusillos oriunda, simplicia, interdum ramosa, cylindrica, erecta, recta, subhyalina vel pallide brunnea, versus apices pallidiora, leavia, usque ad 32 μ longa, 2.5 - 3.5 μ crassa, septis paucis praedita. Cellulae conidiogenae holoblasticae, discretiae, sympodiales vel synchronicae, ampulliformes usque ad 13 μ longa, 2.5 - 3 μ latae, superne attenuatae, 1 - 1.5 μ latae; apex nodosus, denticulatus. Conidia sicca, acropleurogena, ex denticulis terminalibus successivis singulatim producta, falcata, continua, hyalina, laevia, 17 - 22 X 1 - 1.5 μ .

In caulibus emortuis Bambusae, Auburn, Lee County, Alabama, April 1978, R. Munsey, AUA, holotypus.

Colonies effuse, brownish to black, spreading. Mycelium partly superficial, partly immersed in the substratum, composed of branched, septate, hyaline to pale brown, smooth, 2 - 4 μ wide hyphae. Stroma plectenchymatic, flat, repent, composed of pale brown to brown, irregular cells, superficial. Chlamydospores terminal or intercalary, frequently in chains, ovoid to ellipsoid, thick-walled, smooth, brown, abundant. Conidiophores macronematous, mononematous, arising singly or in loose fascicles of a few from stromatic cells or from superficial, repent hyphae, simple or sometimes branched, cylindrical, subhyaline to pale brown, paler distally, smooth, up to 32 μ long, 2.5 - 3.5 μ wide, usually with one or two septa especially when arising from hyphae. Conidiogenous cells holoblastic, discrete, sympodial to synchronous, narrowly ampulliform, up to 13 μ long, 2.5 - 3 μ wide at the base, narrowed to 1 - 1.5 μ wide distally, but slightly inflated at the extreme apex and bearing a number of small denticles each of which produces a single conidium. Conidia dry,

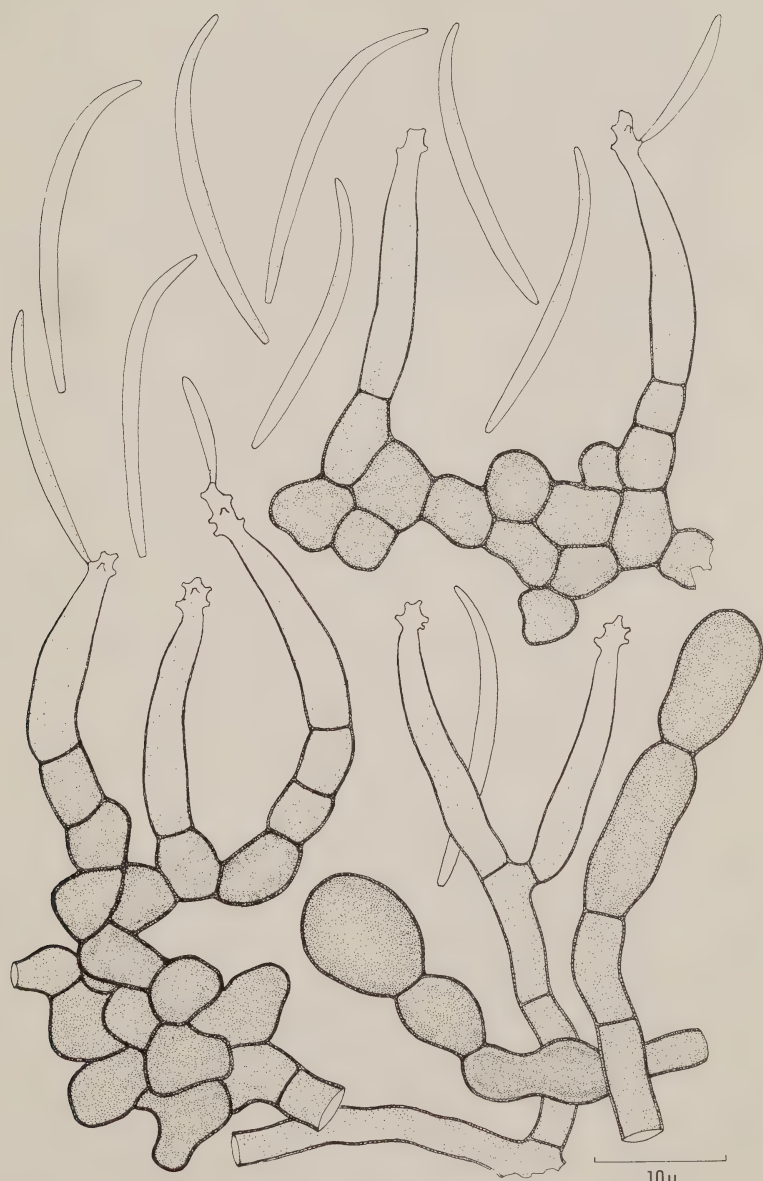


FIGURE 2. *Idriella bambusae*

acropleurogenous, produced in sympodial succession, falcate, curved more abruptly above, attenuating to a pointed apex, narrowly truncate at the base, continuous, hyaline, smooth, $17 - 22 \times 1 - 1.5 \mu$.

On dead stems of *Bambusa* sp.; N. America.

Specimen examined: on *Bambusa* sp., Auburn, Lee County, Alabama, April 1978, R. Munsey, AUA, type.

Of the species of *Idriella* described to date *I. bambusae* most clearly resembles *I. couratarii* and *I. variabilis*. Its chlamydospores are very similar to those of these two species and there is an appreciable overlap in conidium length among the three. The conidia of *I. bambusae* however show less variation in length than those of either *I. couratarii* or *I. variabilis* being consistently towards the upper limit of their range and frequently several microns above. The conidia of *I. bambusae* are also narrower than those of the other two species. Additional distinguishing characteristics of *I. bambusae* are a greater degree of attenuation and curvature toward the upper third of the conidia and the presence of a narrow, but easily discernible, truncation at the base. It also differs from *I. variabilis* in having much shorter conidiophores whose apices are not as inflated but which bear prominent denticles.

Idriella variabilis Matsushima, Microfungi of the Solomon Islands and Papua-New Guinea, 31, 1971 (Fig. 3).

= *Circinotrichum fertile* Pirozynski and Hodges, Can. J. Bot. 51:160, 1973 [fide Matsushima, 1975].

= *Idriella fertilis* (Pirozynski and Hodges) Matsushima, Icones microfungorum a Matsushima lectorum 86, 1975.

Colonies effuse, brown. Mycelium partly superficial, partly immersed in the substratum, composed of branched, septate, hyaline to pale brown, smooth, $1 - 5 \mu$ wide hyphae; sometimes aggregated irregularly to form stromatic tissue. Chlamydospores terminal or intercalary, frequently in chains, abundant, subglobose to ellipsoid, thick-walled, smooth, brown. Conidiophores macronematous, mononematous, crowded, arising in fascicles of a few from stromata or from superficial repent hyphae, cylindrical, unbranched, erect, straight, pale brown to brown, paler towards the apex which is subhyaline, up to 90μ long, $3 - 4 \mu$ wide. Conidigenous cells holoblastic, integrated, terminal, cylindrical, up to 23μ long, 3μ wide at the base, narrowed to $1.5 - 2 \mu$ wide distally; inflated, nodose, $2.5 - 3 \mu$ wide at the extreme apex. Conidia acropleurogenous, produced in sympodial succession, subfalcate, continuous, hyaline, smooth, $20 \times 2 \mu$.

On dead leaves of *Castanopsis*, *Persea*, *Quercus*, *Sequoia* and *Tsuga*, and from soil; Japan, N. America, Papua-New Guinea.

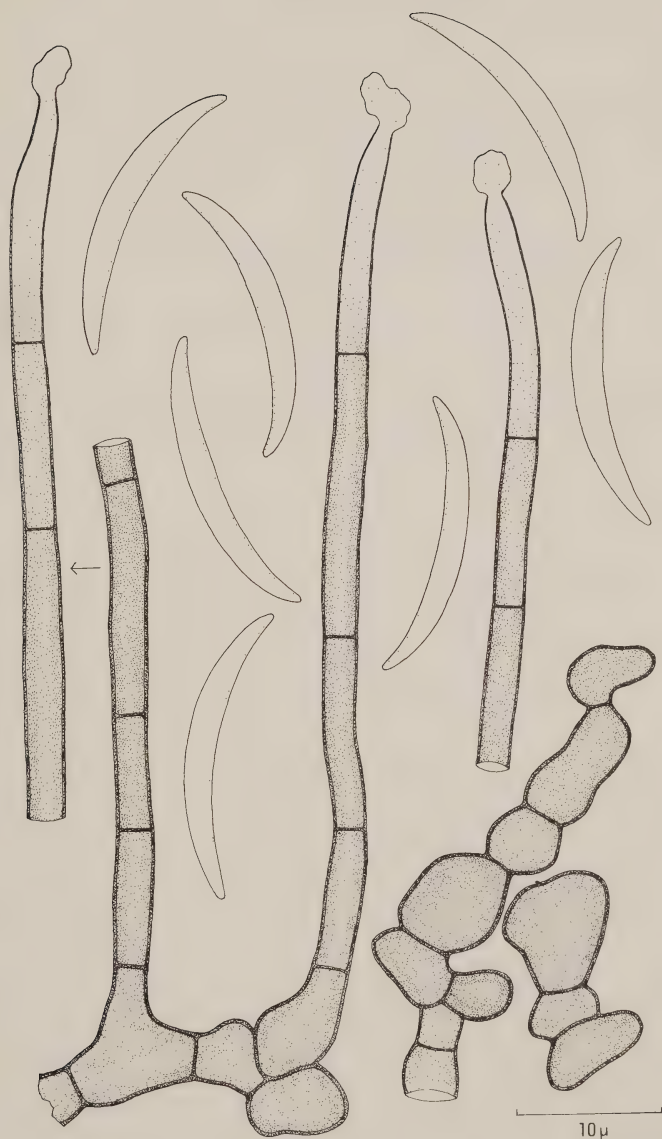


FIGURE 3. *Idriella variabilis*

Specimen examined: on *Q. nigra*, Auburn University, Lee County, Alabama, May 18, 1978, R. C. Sinclair.

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I thank Dr. J. Leland Crane, Illinois Natural History Survey, for reviewing the manuscript.

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NOTES ON HYPHOMYCETES. XXXI. *CHAETOPSINA AUBURNENSIS* SP. NOV.

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ABSTRACT

Chaetopsina auburnensis Morgan-Jones, a new species, is described and illustrated from collections made on fallen leaves of *Quercus nigra* L. in Alabama. It is compared with several fungi possessing similar morphologies.

INTRODUCTION

A number of dematiaceous hyphomycetes that produce phialidic conidiogenous cells directly from cells of robust, erect setae are known. Such fungi are classified in the genera *Chaetopsina* Rambelli, *Codinaeopsis* Morgan-Jones, *Cryptophiale* Pirozynski, *Gonytrichum* C.G. & F. Nees ex Pers., and *Zanclospora* Hughes and Kendrick. In *Circinotrichum fertile* Pirozynski and Hodges, which Matsushima (1975) considered to be the same fungus as *Idriella variabilis* Matsushima, the conidiogenous cells originate in the same way but in this taxon they are polyblastic.

A fungus, apparently undescribed, producing monophialidic conidiogenous cells in the manner of the above named genera has been collected on three occasions on fallen leaves of *Quercus nigra* in Alabama. It is considered best assigned to the genus *Chaetopsina*. It is, however, readily distinguishable from the two species of that genus described hitherto.

TAXONOMIC PART

Chaetopsina auburnensis sp. nov. (Figs. 1 and 2)

Coloniae effusae, pilosae, atrobrunneae vel nigrae. Mycelium immersum, ex hyphis septatis, ramosis, pallide brunneis, laevibus, 2 - 4 μ crassis compositum. Setae singulatim dispersae vel fasciculatae, simplices vel ramosae, erectae, rectae vel curvae, septatae, laeves, crasse

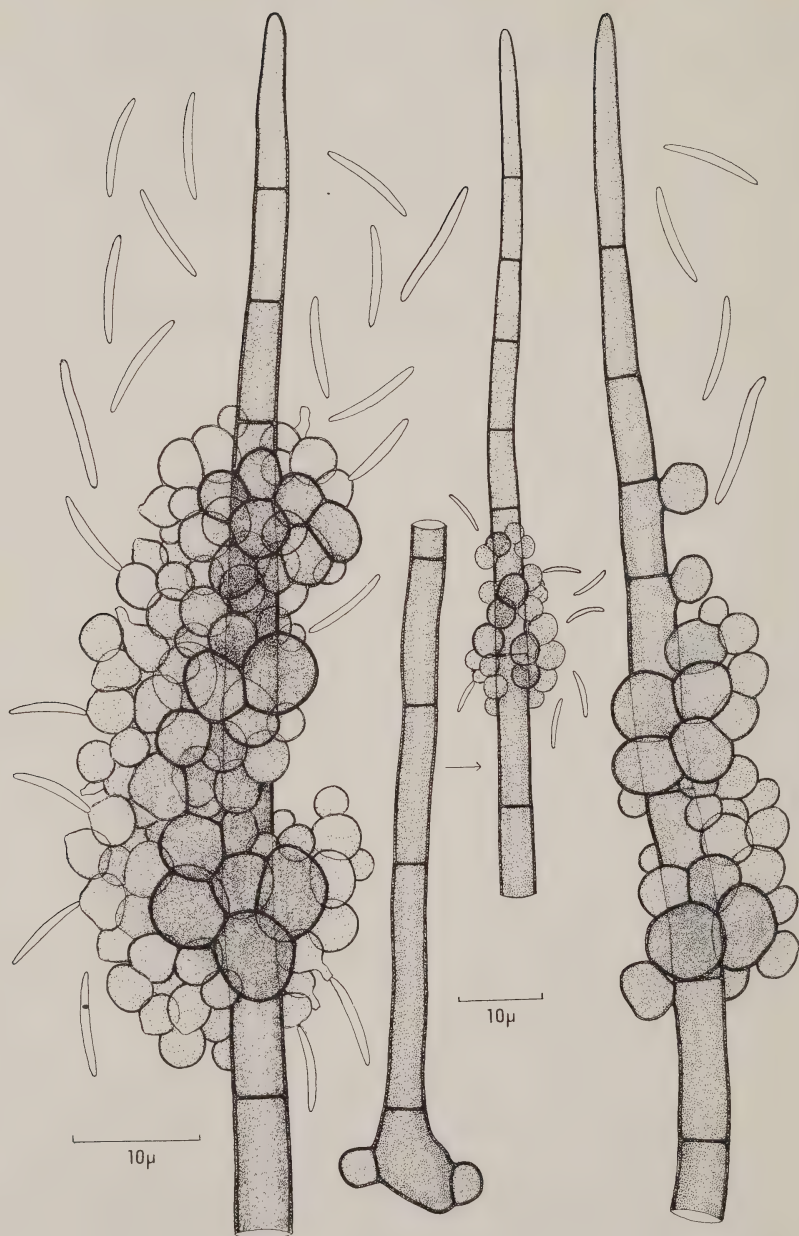


FIGURE 1. *Chaetopsina auburnensis*.
Fertile setae (conidiophores)

tunicatae, brunneae, superne gradatim angustiores et pallidiores, apicem versus subhyalinae, usque ad 400 μ longae, 6 - 7 μ crassae, basi 12 - 15 μ , apice 2 μ crassae, cellulas conidiogenas e latere gerentes. Cellulae conidiogenae (monophialides) discretiae, determinatae, circa setas in fasciculis exorientes, ampulliformes, laeves, pallide brunneae. Conidia hyalina, aseptata, fusiformia, recta vel leviter curvata, laevia, 4 - 8 X .5 - .75 μ .

In folis dejectis *Quercus nigrae*, Auburn University, Lee County, Alabama, April 1976, E.G. Ingram, AUA, holotypus.

Colonies effuse, hairy, dark brown or blackish. Mycelium immersed, composed of septate, branched, pale brown, smooth hyphae 2 - 4 μ wide; sometimes aggregated into loosely arranged stromata of ellipsoid to subglobose, thick-walled, 5 - 7 μ wide cells. Setae scattered singly or sometimes in loose fascicles of a very few, simple or branched, erect, straight or slightly curved, septate, brown, gradually narrowing and becoming paler distally, subhyaline at the apex, thick-walled, up to 400 μ long, 6 - 7 μ wide in the middle part, 12 - 15 μ wide at the bulbous base, 2 μ wide at the apex; branches, of which there may be few to many, setiform, septate, pale brown, radiating from a single locus, up to 150 μ long, frequently intermixed at their point of origin with subglobose stalk cells. Conidiogenous cells monophialidic, crowded, discrete, determinate, ampulliform to lageniform, pale brown to subhyaline, 2.5 - 3 μ wide, often with short, narrow necks, arising in dense groups around the middle part or about two-thirds the way up the setae, formed directly from the cells of the setae or, more usually, from subglobose to somewhat angular, pale brown to brown stalk cells, 4 - 6 μ in diameter. Conidia hyaline, aseptate, fusiform, straight or slightly curved, smooth, 4 - 8 X .5 - 1 μ .

On fallen leaves of *Quercus nigra*; N. America.

Collections examined: (1) on *Q. nigra*, Auburn University Forestry Plots, Auburn, Lee County, Alabama, April 1976, E.G. Ingram, AUA, type; (2) on *Q. nigra*, Chewacla State Park, Lee County, Alabama, May 1976, G. Morgan-Jones, AUA; (3) on *Q. nigra*, same location as type, May 1978, R.C. Sinclair.

Chaetopsina auburnensis shows considerable variation in the morphology of its setae. In a few instances setae have been observed bearing neither stalk cells nor lateral branches. Sometimes setae bear only one or a few lateral branches and no stalk cells. Where there are many branches a cluster of stalk cells is also usually present, indeed some of the branches may originate from stalk cells. Rarely, if ever, are conidiogenous cells produced on setae bearing branches however.

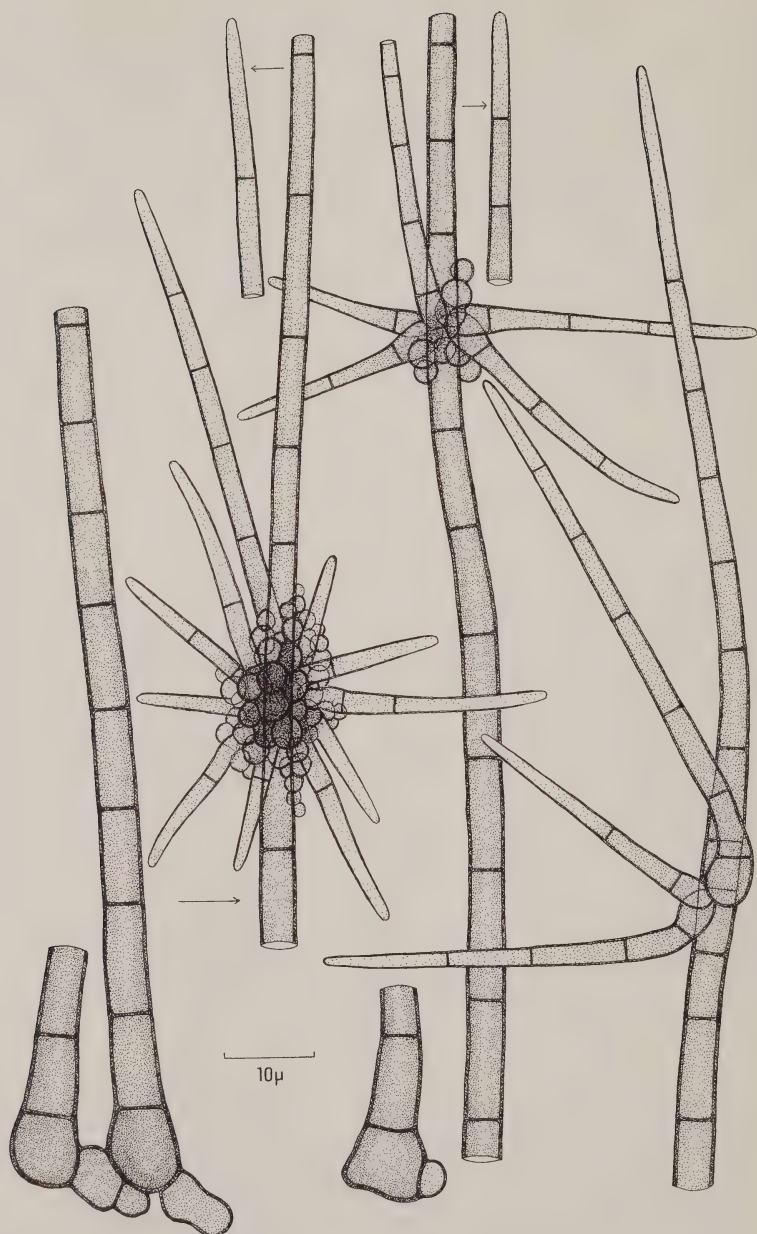


FIGURE 2. *Chaetopsina auburnensis*.
Sterile setae

Lateral setal branches are known in several fungi of similar morphology. For example Pirozynski and Hodges (1973) noted the occurrence of setiform so-called 'false branches' arising from short lengths of hyphae produced laterally on the setae of *Circinotrichum fertile*. Encircling hyphae produced from the setose conidiophores of *Codinaeopsis gonytrichoides* (Shearer and Crane) Morgan-Jones sometimes behave similarly, growing out to give rise to setose branches. Setose conidiophores bearing a number of setiform branches are characteristic of *Gonytrichum macrocladum* (Sacc.) Hughes.

Chaetopsina fulva Rambelli, the type species of *Chaetopsina*, was described from collections on fallen leaves of *Cedrus deodara* Loud., *Laurus nobilis* L., *Carpinus* and *Quercus* in Italy (Rambelli, 1956). It has subsequently been found in Japan on leaves of *Pinus densiflora* Seib. and Zucc. (Tubaki and Saito, 1969) and on *Cinnamomum japonicum* Sieb. and *Machilus thunbergii* Sieb. and Zucc. (Matsushima, 1975). There are also records of its occurrence in soil in Canada (Barron, 1968), on rotten leaves from Papua-New Guinea (Matsushima, 1971) and on fallen leaves of *Persea boronicea* Spreng. in the U.S.A. (Pirozynski and Hodges, 1973). The fungus is characterized by possession of erect, subulate, brown, setiform conidiophores bearing short, hyaline, hypha-like lateral branches which give rise to a cluster of monophialidic, lageniform conidiogenous cells. Its conidia are simple, cylindrical and hyaline. Pirozynski and Hodges (1973) reported that the conidiogenous cells in their collection were almost globose.

Matsushima (1971) described a second species, *Chaetopsina ramifera*, collected on leaves of *Castanopsis* sp. in Papua-New Guinea. This differs from *C. fulva* in that the setiform conidiophore stipe produces a verticil of 1 to 4 branches of similar morphology in addition to a number of short, repeatedly branched hyphae which give rise to hyaline conidiogenous cells. The conidia are somewhat fusiform and slightly curved.

Chaetopsina auburnensis can be distinguished from both *C. fulva* and *C. ramifera* by several characteristics. The presence of dense clusters of more or less subglobose, thick-walled, brown stalk cells from which the conidiogenous cells arise is a unique feature of *C. auburnensis*. Other distinguishing features are the radiating setal branches and conidium size.

ACKNOWLEDGMENT

I am grateful to Dr. C.J.K. Wang for reviewing the manuscript.

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- PIROKYNSKI, K.A. and C.S. HODGES. 1973. New Hyphomycetes from South Carolina. Can. J. Bot. 51:157-173.
- RAMBELLI, A. 1956. *Chaetopsina* nuovo genere de ifali demaziacei. Atti. Accad. Sci. Ist. Bologna Rc. 3:191-196.
- TUBAKI, K. and T. SAITO. 1969. *Endophragmia alternata* sp. nov. and other Hyphomycetes on *Pinus* leaves in Japan. Trans. Br. mycol. Soc. 52:477-482.

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FOLIICOLOUS ASCOMYCETES: 3. THE STALKED CAPNODIACEOUS SPECIES

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SUMMARY

This study is intended as a monographic revision of stalked fungi in the taxon Capnodiaceae von Höhnelt (1910) sensu von Arx and Müller (1975). Two genera are recognized. *Scorias* and *Phragmocapnias* both produce hyaline ascospores with two or more transsepta. *Phragmocapnias* is distinguished from *Scorias* by the presence of setae on the outer surface of the locule wall.

INTRODUCTION

In order to reevaluate the specific and generic concepts, all specimens cited in the literature which could be located, as well as other collections, were examined. Observations were made of all possible taxonomically significant characters. Concepts of taxa were then formulated on the basis of the resulting data analysis. Descriptions in the literature were utilized for specimen identification and in an understanding of the historical position of the species concerned. The name selected to represent my concept of a valid taxon was determined from following the International Code of Botanical Nomenclature (Stafleu, 1972). Cognizance was taken of the recommendations by the International Mycological Association Nomenclature Secretariat, prepared as a result of deliberation concluded in August 1977 at the 2nd International Mycological Congress.

The holomorphic species is basically comprised of one and possibly two components. The prime holomorphic part of the nomenclatorially valid taxonomic system is the sexual reproductive component of the life history--the teleomorphosis (Hennebert and Weresub, 1977). A second component is any asexual reproductive part of the holomorphic life history--the anamorphosis or anamorphoses. The specimens were examined for a teleomorphic documentation of a particular holomorph. Any anamorphosis demonstrated by following a protocol described below to be a

component of a holomorph was so recognized.

The taxonomically reliable structure produced by the teleomorphosis is the ascocarp. The wall and the sexual reproductive system contained within are perceived as two basic ascocarp components. Reliable wall characters which can be utilized in taxon definition are the cellular pattern of wall tissue and external and internal appendages; the characters of the sexual system relate to the ascus and the ascospores.

The tissue types used by Korf (1951) apply to the wall surrounding the hymenial locule. Appendages may develop from the exterior or interior surface of the locule wall. External appendages are seta, clypeus and stalk. The seta is a lateral to apical outgrowth which forms from a single cell during locule wall formation. In all Capnodiaceae species examined so far, the setal wall contains a melinoid pigmentation; the seta may be septate at maturity or not. The clypeus is a shield-like appendage covering the ascocarp and is not present in the capnodiaceous species discussed in this monograph. The stalk is regarded as an appendage. It differs from the seta in position and in time of formation in the development of the ascocarp. The stalk is a column of tissue which is terminated with the hymenial system surrounded by the locule walls. The stalk is similar to clypeus in that both structures begin formation before the initiation of the portion of the ascocarp which will come to contain the hymenial system. The stalk differs from the clypeus in the attachment to the locule wall. The columulate stalk tissue is always attached below the wall surrounding the hymenial locule; the shield-like clypeus has an apical to lateral attachment to the locule wall.

The hymenial system consists of asci with specialized walls. This type of ascus is characterized as bitunicate, in the sense of Luttrell (1951), and exhibits a *nasse apicale* (Reynolds, 1971a). An additional character is the reaction of the ascus wall to the Kohn-Korf iodine-potassium hydroxide protocol (1975). The blue coloration characteristic of a positive reaction is confined to the outer layer of the ascus and is more intense in younger asci. This suggests that the primary exoascus layer of the bitunicate ascus is reactive while the secondary endoascus layer is not. The ascospore wall is inconsistently Kohn-Korf positive. A positive reaction is more difficult to demonstrate in older herbarium material in that more time is required for the blue color to be seen and the reaction is also less intense.

The mature ascus will contain usually eight ascospores; no surrounding cytoplasm remains. The wall is considerably reshaped to accommodate the ascospores. The *nasse apicale* is best observed in the ascus after the secondary wall layer, the endoascus, has been deposited on

the inner surface of the primary wall layer, the exoascus, which is formed during the extension of the ascus mother cell. With the onset of meiosis and the subsequent ascoprogenesis, the ascus may change shape and the walls may become thinner in the lower areas. The *nasse apicale* may appear obscured in some mature asci and wider in some species than others.

The ascospore is best described when mature in the ascus before discharge. Spore pigmentation is a reliable character at this stage of development. A melinoid or orange to yellow brown (Kelly and Judd, 1976) pigmentation ultimately develops in all capnodiaceous species, but the time of pigment deposition in the ascospore wall is taxonomically significant. Some capnodiaceous species produce the pigmentation during ascospore maturation. In others, the pigmentation does not appear until after discharge from the ascus and the onset of the germination process. The latter ascospores are termed hyaline to indicate that the mature ascospore has no wall pigmentation before discharge from the ascus. Occasionally hyaline ascospores will be seen to germinate in the ascus and thus have developed some pigmentation; these have been mistakenly described as pigmented or having an unusual shape. A mature ascospore can be recognized by thickened outer walls, completed cross walls and a highly vacuolated cytoplasm, sometimes characterized by the presence of oil droplets. Immature ascospores by contrast have thinner walls and a dense non-vacuolated protoplast. Septation of the ascospore is also a reliable taxonomic character. The ascospore follows a distinct pattern of septum development during its development in the ascus. The first septum is formed perpendicular to the long axis of the spore and divides the protoplast into two cells. Then each half of the newly divided spore becomes once or more transversely septated. The longitudinal septa form after the transverse septa have formed. Occasionally, a collection of a particular species will produce ascospores in which the longisepta fail to appear; however, examination of many ascocarps will demonstrate the usual character. At onset of germination, a germ tube protrudes from one or more ascospore cells. Changes in ascospore morphology and color can accompany this process.

Luttrell (1951) proposed a device for organizing the Pyrenomycetes which is useful in the taxonomy of these fungi as a unifying character. Luttrell meant the centrum to refer to the characters within the ascocarp during development and at maturity. I (Reynolds, 1978b) have described the Capnodium centrum which characterizes the fungi monographed here. The major elements of this centrum type are the uniloculated ascocarp, the bitunicate ascus and the periphysoids.

The anamorphosis or anamorphoses must be demonstrated with non-intuitively derived positive proof to be a holo-

morphic life history component in order to be taxonomically significant. Taxonomically reliable structures produced by the anamorphosis are conidia and any attendant fruit bodies. The following protocol will demonstrate the required positive proof of holomorphic pleomorphism, i.e. the relationship of any anamorphosis to a teleomorphosis.

1. Primary confirmation from spore production in pure culture by an isolate which is derived from one of the following sources:

- a. Ascospore from a single ascospore isolate.
- b. Conidiospore from a single ascospore isolate.
- c. Ascospore from a single conidiospore isolate.

2. Secondary confirmation, to be used in addition to #1, from spore production utilizing specimens representing an annual growth cycle which meet all of the following requirements:

- a. Produced in nature,
- b. a series of fruit bodies,
- c. obtained in chronological sequences of maturity,
- d. from a single collection site.

The secondary confirmation procedure is least desirable when used alone, but can give a basis for reasonable assumption of holomorphic pleomorphism.

Unacceptable means which rely on an intuitive assumption of holomorphic pleomorphism found in the literature include:

- a. *Prima facie* determination from side-by-side occurrence of several reproductive states in a single collection (e.g. McAlpine, 1896).
- b. Comparative gross morphology of sexual and asexual fruit bodies (e.g. Yamamoto, 1954b).
- c. A dependence on hyphal morphology in order to imagine organic relationships between reproductive states (e.g. Hughes, 1976).

The data for each specimen are regarded as a unit of identification. For this reason, the information is cited as written on a label without update. For example, names of geographic localities and scientific names of associated higher plants are not edited for contemporary accuracy. This approach allows specimen verification as well as correction of discrepancies in an author's original or quoted material. The label information is categorized into Collector, Location, Collection date, Associated plant, Herbarium data and Original determination. The categories where information is available are listed

sequentially; each is punctuated by semicolons and commas. The label information statement is terminated by a period.

Example: McGinty, H. A. #10: Philippines, Camarines Sur, Magarao: 20 XII 1908: Ficus bugulu: NY100*, (S), (Fungi Exsicatti Philippinensis 23); LAM501: Capnodium +.

The H. A. McGinty specimen number 10 was collected in the Philippines, Camarines Sur Province, in the town of Magarao, on 20 December 1908. The fungus was found associated with Ficus bugulu. The collection examined came from the New York Botanical Garden and has the number 100 --the asterisk indicates that this is type material; the specimen originally came from the Stockholm herbarium and was number 23 in Fungi Exsicatti Philippinensis; the LAM number assigned to duplicate or slide preparation from the collection is 501. The initial determination of the collection was Capnodium; the "+" indicates that other fungi were noted in the collection.

KEY TO SPECIES

A Ascocarp appendaged with stalk and setae

PHRAGMOCAPNIAS BETLE

A' Ascocarp appendaged with stalk only B

B Ascocarp occurring singly or severally on projections from surface of hygroscopic stroma; distribution temperate North America

SCORIAS SPONGIOSA

B' Ascocarp not occurring as in B, distribution tropical to subtropical C

C Ascospores 12-17 μ x 3-6 μ

SCORIAS BRAZILIENSIS

C' Ascospores 19-28 μ x 3-6 μ

SCORIAS PHILIPPINENSIS

NOMEN HOLOMORPHOSIS GENUS:

Phragmocapnias Theissen and Sydow emend. Reynolds 1917. Annales Mycologici 15:480. Pro Parte, teleomorphosis only.

TELEOMORPHOSIS: Ascospores hyaline, transseptate, ascus bitunicate; Hymenium basal, surrounded by wall which is internally appendaged with periphysoids and externally

appendaged with setae and stalk; Ascocarp uniloculate, ostiolate.

ANAMORPHOSIS: Incertus.

Type species: Phragmocapnias betle (Sydow and Butler) Theissen and Sydow emend. Reynolds

NOMINA SYNONYMA GENUS:

=Antennellopsis Mendoza

1925. B. P. Bishop Mus. Bull. 19:55-56. Pro Parte, teleomorphosis only.

=Chaetoscorias Yamamoto

1955. Spec. Publ. in honor of 60th anniversary of Dr. Y. Tochinae and T. Jukushi. Kasai Shuppan Inst., Minato-ku, Tokyo, pp. 54, 56. Pro Parte, teleomorphosis only.

=Neocapnodium Yamamoto

1955. Spec. Publ. in honor of 60th anniversary of Dr. Y. Tochinae and T. Kukushi. Kasai Shuppan Inst., Minato-ku, Tokyo, pp. 54, 56. Pro Parte, teleomorphosis only.

=Neocapnodium Yamamoto

1957. Sci. Rep. Hyogo Univ. of Agr., Agr. Biol. Ser. 3:32. Pro Parte, teleomorphosis only.

=Neocapnodium Yamamoto emend. Hughes

1976. Mycologia 68:794-795. Pro Parte, teleomorphosis only.

=Phragmocapnias Theissen and Sydow emend. Hughes

1976. Mycologia 68:799-800. Pro Parte, teleomorphosis only, NON Trichomerium Spegazzini.

NON Phragmocapnias (Theissen and Sydow) emend.

Batista and Ciferri

1963. Saccardo 2:177. Spores were considered to be pigmented.

DISCUSSION

Spegazzini (1918) accepted Limacinia Neger as having hyaline ascospores. He established Phragmocapnias as a new genus on the basis of Capnodium betle Syd. & Butl. (Sydow et al. 1917) and distinguished it from Limacinia by, "...sporen braun...." He was wrong on both counts. I have seen lectotypic material of Limacinia fernandeziana Neger, the type species of Limacinia, and know the ascospores to be pigmented. I have also examined the C. betle holotype, as well as an isotype. The type specimen of C. betle is Stockholm (S) is delapidated in that the ascocarps are moldy and mostly overmature. The specimen in Kew (K) is

more scanty, but in the same condition. Most ascocarps in the type material are empty, without asci and ascospores. Ascocarps containing asci with ascospores are sparse. Hughes (1976) correctly redescribed the ascospores as hyaline, in contrast to the, "...dein fuscis" characterization by Sydow and Butler. Hughes mentioned pigmented spores on the substratus surface without mention of how they were determined to be ascospores. The fruit body stalk was not recognized in Hughes' redescription from the type material. Hughes (1976) also stated that an anamorphosis was, "...attached to the same hyphae..." as the teleomorphosis. I do not accept this observation; the skepticism I expressed earlier (1978a) concerning the intuitive attitude toward holomorphic pleomorphy is underscored. In their major treatment of the Capnodiaceae (1963a), Batista and Ciferri accepted Spegazzini's definition of Phragmocapnias as having pigmented ascospores. They did not examine the types nor authenticate material of most of the species they included in this genus.

The Phragmocapnias ascocarp is appendaged with setae, as Hughes (1976) also pointed out, and additionally with stalk. The stalk is minimally present, but distinct, in the type material, when compared to collections from the Pacific Basin. Capnodium coffeicola Puttemans, the supposed type species of the genus Trichomerium which was listed by Hughes (1976) as a synonym of Phragmocapnias without examination of the holotype. I examined Puttemans' specimen in Rio de Janeiro. I do not accept Hughes' synonymic placement of Trichomerium in Phragmocapnias.

The name Phragmocapnias seems problematic because of its establishment based on a misconception of the type species. However, I utilize Phragmocapnias with the assumption that the recognition of hyaline ascospores in the type species will also demand a change in the single spore related character used to establish the genus. Spegazzini (1918) should have correctly written, "sporen farblos." The parts of the International Code of Botanical Nomenclature dealing with priority are in regard to a name attached to a type and are unaffected by a different taxon concept resulting from a redescription of that type so long as the original holotype is clearly utilized for the same name.

I have revised Yamamoto's contributions to a degree that some explanation is needed. Yamamoto stated (1958a) that all his specimens collected, "...during the period 1937-1942..." remained in Taiwan. "The collected fungi enabled the author to carry out taxonomic as well as ecological studies in the phytopathological laboratory..." in Taiwan. He later wrote (1961), "The results of these investigations were mainly reported in the Transactions of the Natural History Society of Formosa, Journal of the Society of Tropical Agriculture (Formosa), Annals of the Phytopathological Society of Japan, and Science Reports of

the Hyogo University of Agriculture during the period 1940 to 1958...." Yamamoto went to some length in order to prove his assumption that the teleomorphosis and the anamorphoses found in foliicolous colonies were holomorphic. He utilized experimental techniques involving pure culture work as well as randomly collected specimens from nature. The statements in his publications imply that definite proof was obtained of holomorphic pleomorphy in sooty mold Ascomycetes. In order to examine Yamamoto's specimens, and to verify the experimental work, I visited Japan and Taiwan. I was able to interview his former laboratory technician as well as colleagues, concerning Yamamoto's work. I examined the collections cited in his publications as well as additional ones. In addition, I obtained pure culture isolates of sooty mold fungi from Taiwan localities identical to those utilized by Yamamoto for the same purpose. Yamamoto's experimental protocol was duplicated with the Taiwan isolates.

The Yamamoto collections in Taiwan contained specimens marked "typus" for species described by other authors. No duplicate specimens of foreign collections were located in his collections representing the legitimate holotypes of these same species. I strongly suspect that Yamamoto did not see original types or other authenticated material. The material of Japanese mycologists working with Japanese sooty mold Ascomycetes was largely war destroyed.

No cultures from ascospores of Taiwan sooty mold Ascomycetes were obtained by me. Pycnidiospore derived cultures yielded asexual fruit bodies similar to those from which the conidia were derived.

Several aspects of Wataro Yamamoto's *modus operandi* are evident and are important to note in that they effected the taxonomy he published.

1. Yamamoto established his own "type" from a Taiwan collection for a non-Yamamoto species.

2. Yamamoto did not accurately describe the ascocarps he utilized as the basis of several taxa.

3. Yamamoto did not obtain cultures from single ascospore isolate; ascocarps of sooty mold Ascomycetes were not produced in pure culture.

4. Yamamoto obtained cultures from single pycnidiospore isolates; conidia and fruit bodies of dematiaceous fungi and other Deuteromycetes were produced in pure culture.

5. Yamamoto failed to demonstrate a connection between a sooty mold teleomorphosis and any anamorphoses.

6. Yamamoto compared nature and pure culture derived

pycnidia with nature derived ascocarps, i.e. he intuitively determined perfect-imperfect relationships on the basis of gross morphology similarities and primae facie associations of fruit bodies found in the Taiwan collections he made.

7. Yamamoto defined taxa so as to include a teleomorphosis and anamorphoses merely assumed to be holomorphic components, i.e. without positive proof.

8. Yamamoto assigned holomorphic names to certain collections on the basis of anamorphoses present rather than a teleomorphosis.

9. Yamamoto's Taiwan and Japan publications on Taiwan fungi were done on the basis of data produced during his stay in Taiwan although his forced wartime return to Japan blocked access to his materials.

I conclude that Yamamoto's taxonomy of Taiwan fungi was highly intuitive and unsupported by the experimental work he undertook.

NOMEN HOLOMORPHOSIS SPECIES:

Phragmocapnias betle (Sydow and Butler) Theissen and Sydow emend. Reynolds.

TELEOMORPHOSIS: Ascospores hyaline, cylindrical to elliptical, with bluntly acute apexes, 16-29 x 3-5 μ , with 3 (-5) transsepta; Ascus bitunicate with narrow apical pore present at apex of inner wall, obclavate, 35-50 μ in length; Ascus Wall Kohn-Korf (IKI-KOH) reaction positive; Hymenium basal in locule, surrounded by wall comprised of textura angularis tissue; Locule Wall internally appendaged with periphysoids which are branched, septate, hyaline, present or absent at ascocarp maturity; Locule Wall externally appendaged with setae and subtending stalk, setae 55-115 μ x 5-6 μ , septate or not at maturity, stalk single, discoid to cylindrical, 12-40 μ . Ascocarp containing a single locule, ostiolate. 75-165 μ x 70-120 μ .

ANAMORPHOSIS: Incertus.

Type Specimen: S. Som, A. L.; East Pakistan, Dacca: 5 IV 1910: Piperis betle. Isotype Specimen: K.

NOMEN SYNONYMY SPECIES:

(Basionym) Capnodium betle Sydow and Butler 1911. *Annales Mycologici* 9:384. Pro Parte, teleomorphosis only.

=Antennellopsis mangiferae Mendoza

1925. B. P. Bishop Mus. Bull. 19:55-56. Pro Parte, teleomorphosis only.
- =Antennellopsis mangiferae Mendoza emend. Batista and Ciferri
1963. Saccardo 2:65-66. Pro Parte, teleomorphosis only.
- =Capnodium tanakae Shirai and Hara emend. Sawada
1929. Studies Citrol 3:264. Cited as C. tanakae (Shirai and Hara) Sawada. Pro Parte, teleomorphosis only. NON Capnodium tanakae Shirai and Hara.
- =Neocapnodium tanakae (Shirai and Hara) Yamamoto
1957. Sci. Rep. Hyogo Univ. of Agr., Agr. Biol. Ser. 3:33. Pro Parte, teleomorphosis only. NON Capnodium tanakae Shirai and Hara.
- =Neocapnodium tanakae Yamamoto
1954. Ann. Phytopath. Soc. Japan 19:1. Nomen nudum, genus not yet described.
- =Scorias communis Yamamoto
1954. Ann. Phytopath. Soc. Japan 19:3, 5. Pro Parte, teleomorphosis only.
- =Scorias cylindrica Yamamoto
1954. Ann. Phytopath. Soc. Japan 19:3, 5. Pro Parte, teleomorphosis only.
- =Chaetoscorias vulgare Yamamoto
1957. Sci. Rep. Hyogo Univ. Agr., Agr. Biol. Ser. 3:36. Pro Parte, teleomorphosis only.
- =Chaetoscorias vulgare Yamamoto.
1954. Ann. Phytopath. Soc. Japan 19:5. Nomen nudum, genus not yet described.
- =Antennellopsis vulgaris (Yamamoto) Batista and Ciferri
1963. Saccardo 2:65-66. Pro Parte, teleomorphosis only.
- =Antennellopsis elegans Batista and Ciferri
1963. Saccardo 2:62. Pro Parte, teleomorphosis only.
- =Antennellopsis formosa Batista and Ciferri
1963. Saccardo 2:64. Pro Parte, teleomorphosis only.
- =Trichomerium jambosae Batista and Ciferri
1963. Saccardo 2:213-215. Pro Parte, teleomorphosis only.

PHRAGMOCAPNIAS SPECIES IMPERFECTLY KNOWN:

Antennella citri Sawada

1929. Studies Citrol 3:261. The type of this species is badly damaged. No ascocarps remain in the collection. Sawada later published this species as a synonym of Antennella citrina Hara. See the discussion under Scorias. This species is probably a synonym of P. betle.

EXCLUDED SPECIES

Phragmocapnias callitris (McAlpine) Ciferri and Batista

1963. Saccardo 2:179. The ascospores were considered to be pigmented.

Phragmocapnias crassa (Patouillard) Theissen and Sydow emended Batista and Ciferri

1963. Saccardo 2:179. The ascospores were considered to be pigmented.

Phragmocapnias fulignoides (Rehm) Ciferri and Batista

1963. Saccardo 2:180. The ascospores were considered to be pigmented.

Phragmocapnias heliconiae Batista and Ciferri

1963. Saccardo 2:180-182. The ascospores are pigmented.

Phragmocapnias inspericua (Saccardo) Batista and Ciferri

1963. Saccardo 2:182. This species belongs in the genus Trichomerium.

Phragmocapnias juniperi (Cooke) Theissen and Sydow

1917. Ann. Mycol. 15:480. The ascospores were considered to be pigmented.

Phragmocapnias resinae (Saccardo and Bresadola) Theissen and Sydow emend. Batista and Ciferri

1963. Saccardo 2:182-183. The ascospores were considered to be pigmented.

Phragmocapnias salicina (Montagne) Ciferri and Batista 1963. Quaderno 3:98. This combination was published nomen nudum and was apparently to be based on Capnodium salicinum Montagne emend. Fraser (1935).

Phragmocapnias smiliciana Mendoza

1925. Bulletin B. P. Bishop Museum 19:58-59. This species belongs in the genus Limacina Neger.

SPECIMENS EXAMINED

Batista, A. C. --Brasil, Pernambuco, Jabatao: Croton campestris: URM2794; LAM200721: Antennellopsis elegans +.

Butler, E. J. --Burma, Amherst, Mudon: 6 I 1908:
Piper betle: S, (Herb. Sydow), (Herb. Crypt. Ind. Orient
 1062); LAM200816: Capnodium betle.

Charles and A. Ballon. --Cuba, Santiago de Las
 Vegas: 18 X 1921: Durante repens: URM9129; LAM200724:
Trichomerium jambosae +.

Fenix, E. --Philippines, Palawan: VII 1912: Cocos
nucifera: URM3947, (Herb. P. A. Saccardo); LAM200861:
Antennellopsis mangiferae.

Fujikuro, Y. --Taiwan: 12 XII 1907: Thea senensis:
 TNU; LAM201870: Scorias capitata.

Nascimento, M. L. --Brasil, Pernambuco, Recife,
 Dois Iramos: Mangifera indica: URM2690*; LAM200503:
Antennellopsis formosum +.

Obregon, Rafael. --Colombia, La Esperanza: V 1934:
Labiatae: URM5021, (BPI); LAM200860: Antennellopsis
elegans.

Rhoads, Arthur S. --USA, Florida, Dade County,
 Snapper Creek, between Fairchild Tropical Garden and
 Chapman Field: 1 III 1944: Eugenia axillaris: BPI; LAM
 201519: Capnodium.

Reinking, O. A. --Thailand, Bangkok: 16 I 1920:
 URM5246, (BPI); LAM200723: Trichomerium jambosae +.

Silva, S. J. --Brasil, Pernambuco, Recife, Casa
 Amarella: Psidium guajava: URM2669*; LAM200875: Anten-
nellopsis elegans. Brasil, Pernambuco, Recife: Jambosae
malaccensis: URM2606*; LAM200693: Trichomerium jambosae
 +. Brasil, Pernambuco, Vitoria: Bromelia: URM2635; LAM
 200725: Trichomerium jambosae +.

Som, A. L. --East Pakistan, Dacca: 5 IV 1910:
Piper betle: IMI26117, (Dacca Herb. Crypt. Ind. Orient);
 LAM200969: S*; LAM200816: Capnodium betle.

Stevens, F. L. --British Guyana, Vreid en Hoor: 10
 VIII 1922: Mangifera indica: BISH*; LAM202069: ILL6629;
 LAM200605: Antennellopsis mangiferae. Puerto Rico,
 Utuado: 8 IX 1913: Sesamum indicum: URM9078; LAM20722:
Trichomerium jambosae.

Yamamoto, W. --Taiwan, Sintiku, Sansa: 19 III 1942:
Citrus poonensis: TNU; LAM201825: Scorias philippensis.
 Taiwan, Sintiku, Sansa: 19 III 1942: Citrus pooensis:
 TNU; LAM201843: Capnodium tanakae. #95: Taiwan, Sintiku,
 Sansa: 19 III 1942: Ficus retusa: TNU; LAM201824:
Scorias philippensis. Taiwan, Sintiku, Simpδ: 18 III
 1942: Citrus maxima: TNU; LAM201814: Scorias philippen-
sis. Taiwan, Sintiku, Simpδ: 18 III 1942: Citrus

maxima: TNU; LAM201844: Capnodium tanakae. #59 --Taiwan, Sintiku, Simpô: 18 III 1942: Citrus tankan: TNU; LAM 201849: Antenella citri, Capnodium tanakae. #92 --Taiwan, Sintiku, Simpô: 19 III 1942: Citrus kotokan: TNU; LAM 201850: Antenella capnodium. Taiwan, Taihoku, Mokusaku: 16 III 1941: Leleba olhami: TNU; LAM201820: Scorias philippensis. --Taiwan, Taihoku, Sirin: 23 II 1941: Trema orientalis: TNU; LAM201811: Scorias philippensis?. #14 --Taiwan, Taihoku, Sirin: 16 II 1942: Citrus maxima: TNU; LAM201812: Scorias philippensis. --Taiwan, Taihoku, Sinten: 23 X 1938: Dendrocalamus latiflorus: TNU; LAM 201816: Scorias philippensis. --Taiwan, Taihoku, Sinten: 23 X 1938: Mallotus japonicus: TNU; Scorias philippensis. --Taiwan, Taihoku, Sinten: 14 I 1941: Leleba dolichoclada: TNU; LAM201817: Scorias philippensis. --Taiwan, Taihoku, Sinten: 22 II 1942: Schefflera octophylla: TNU; LAM 201818: Scorias philippensis. --Taiwan, Taihoku, Sirin: 29 I 1938: Citrus maxima: TNU; LAM201810: Scorias philippensis. --Taiwan, Taihoku, Sirin: 29 I 1939: Citrus maxima: TNU; LAM201842: Capnodium tanakae. #14 --Taiwan, Taihoku, Sirin: 8 II 1942: Citrus tankan: TNU; LAM 201813: Scorias philippensis. #22 --Taiwan, Taihoku, Tomita-tyo: 12 I 1939: Coffea liberica: TNU*; LAM201801: Scorias philippensis, Scorias communis. #8 --Taiwan, Taihoku, Tomita-tyo: 22 II 1942: Citrus sinensis: TNU; LAM 201848: Antenella citri. --Taiwan, Taihoku, Taihoku: 21 X 1938: Sapindas mukurossi: TNU; LAM201802: Scorias philippensis. --Taiwan, Taihoku, Taihoku: 16 X 1938: Castanea crenata: TNU; LAM201803: Scorias philippensis. --Taiwan, Taihoku, Taihoku: 1 X 1938: Eugenia malaccensis: TNU; LAM201666: Chaetoscorias. --Taiwan, Taihoku, Taihoku: 20 X 1938: Ficus septica: TNU; LAM201667: Chaetoscorias. --Taiwan, Taihoku, Taihoku: 16 XI 1938: Diaspyras kaki var. domestica: TNU; LAM201665: Chaetoscorias. --Taiwan, Taihoku, Taihoku: 12 I 1939: Coffea liberica: TNU; Capnodium tanakae. --Taiwan, Taihoku, Taihoku: 12 I 1939: Ficus septica: TNU; LAM201804: Scorias philippensis. --Taiwan, Taihoku, Taihoku: 13 I 1939: Psidium guajava: TNU; LAM201806: Scorias philippensis. --Taiwan, Taihoku, Taihoku: 13 I 1939: Ficus wrightiana: TNU; LAM201805: Scorias philippensis. --Taiwan, Taihoku, Taihoku: 25 XII 1940: Citrus tankan: TNU*; LAM201836: Capnodium tanakae. --Taiwan, Taihoku, Taihoku: 2 II 1941: Citrus maxima: TNU; LAM201837: Capnodium tanakae. --Taiwan, Taihoku, Taihoku: 9 II 1941: Coffea arabica: TNU; LAM201807: Scorias philippensis. --Taiwan, Taihoku, Taihoku: 10 II 1941: Coffea liberica: TNU; LAM201808: Scorias philippensis. --Taiwan, Taihoku: 28 II 1941: Mallotus repandus: TNU; LAM201839: Capnodium tanakae. --Taiwan, Taihoku, Taihoku: 9 III 1941: Halarrhena antidysenterica: TNU; Chaetoscorias. --Taiwan, Taihoku, Taihoku: 16 III 1941: Ficus bengalensis: TNU; LAM201840: Capnodium tanakae. --Taiwan, Taihoku, Taihoku: 16 III 1941: Gardinia angusta var. ovalifolca: TNU; Scorias philippensis. --Taiwan, Taihoku, Taihoku: 20 V 1942: Myrica rubra: TNU* (neo-type); LAM201800: Scorias cylindrica. --Taiwan, Taihoku,

Taihoku, Tomita-cho: 6 XI 1938: Quercus glandulifera: TNU: Scorias philippensis. --Taiwan, Taihoku Botanical Garden: 13 III 1942: Eugenia malaccensis: TNU; LAM 201815: Chaetoscorias. --Taiwan, Taihoku: 16 II 1941: Citrus paradisi: TNU: Capnodium tanakae. #44 --Taiwan, Taityu, Nama, Nantoo: 20 III 1942: Achras zapota: TNU; LAM201827: Scorias. --Taiwan, Taityn, Nantoo: 21 III 1942: Citrus sinensis: TNU; LAM201826: Scorias philippensis. --Taiwan, Taityu, Nantoo: 21 III 1942: Citrus sinensis: TNU*; LAM201846: Capnodium tanakae. --Taiwan, Taitya, Nisui: 29 I 1942: Coffea arabica: TNU* (neo-type); LAM201669: Chaetoscorias. --Taiwan, Taityu, Nisui: 29 I 1942: Coffea arabica: TNU; LAM201847: Capnodium tanakae. --Taiwan, Tainan, Kansirei: 28 XII 1938: Moesa formosana: TNU; LAM201823: Scorias philippensis. --Taiwan, Taityn, Nama, Nantoo: 20 III 1942: Citrus poeensis: TNU; LAM201845: Capnodium tanakae. --Taiwan, Takao, Kuwarusu: 12 IV 1942: Cinchona: TNU; LAM201668: Chaetoscorias. --Taiwan, Takao, Kurarusu: 12 IV 1942: Cinchona: TNU; LAM201821: Scorias philippensis. --Taiwan, Takao, Kuwarusu: 12 IV 1942: Cinchona: TNU; LAM201841: Capnodium tanakae. --Taiwan, Takao, Kuwarusu: 12 IV 1942: Phyllostachys makinoi: TNU; LAM201822: Scorias philippensis. #33 --Taiwan: 2 XII 1942: Citrus maxima forma buntan: TNU; LAM201828: Scorias philippensis.

DISCUSSION

Yamamoto completely ignored the setal appendage projecting from the outer surface of the ascocarp wall surrounding the hymenial locule. This appendage was found on every ascocarp in each Yamamoto collection cited under the several synonyms of P. betle which was reexamined; the specimens otherwise generally fit the description proffered. The illustration (Yamamoto, 1942b, 1955b, 1957b) of the synonymic species, Neocapnodium tanakae, as having a branch multiply bearing stalked ascocarps is not representative of Taiwan material. I again note that Yamamoto redescribed this Japanese species based on Taiwan material; the illustration was a promulgation as a result of the merger of the Yamamoto redescription with the original description and illustration of Shirai and Hara (Hara, 1916). The Shirai and Hara holotype is defunked; I could not locate additional Japanese material. As indicated in the discussion under "Species incompletely known" Capnodium tanakae Shirai and Hara seems to be a valid temperate Asian species closely related to S. spongiosa.

NOMEN HOLOMORPHOSIS GENUS:

Scorias Fries emend. Reynolds
1825. Systema Orbis Vegetabilis 1:171.

TELEOMORPHOSIS: Ascospores hyaline, transseptate; Ascus bitunicate; Hymenium basal, surrounded by wall which is internally appendaged with periphysoids, and externally

appendaged with stalk; Ascocarp uniloculate, ostiolate.

ANAMORPHOSIS: Incertus.

Type species: Scorias spongiosa (von Schweinitz)
Fries emend. Reynolds

NOMINA SYNONYMA GENUS:

=Scorias Fries emend. Fries
1832. Syst. Mycol. 3:290. Pro Parte, teleomorpho-
sis only.

=Scorias Fries emend. Montagne
1856. Sylloge generum specierumque cryptogamarum
quas in variis operibus descriptas..., nunc ad diagno-
sim... Paris. J. B. Baillaiere. P. 257. Pro Parte,
teleomorphosis only.

=Scorias Fries emend. Saccardo
1882. Sylloge Fungorum 1:83. Pro Parte, teleomor-
phosis only.

=Scorias Fries emend. Ellis and Everhart
1892. North American Pyrenomycetes. Newfield, New
Jersey, Private printing. P. 55. Pro Parte,
teleomorphosis only.

=Scorias Fries emend. Theissen and Sydow
1917. Ann. Mycol. 15:473. Pro Parte, teleomorphosis
only.

=Scorias Fries emend. Yamamoto
1957. Sci. Rep. Hyogo Univ. of Agr., Agr. Biol. Ser.
3:34. Pro Parte, teleomorphosis only.

=Scorias Fries emend. Hughes
1976. Mycologia 68:807. Pro Parte, teleomorphosis
only.

=Antennella Theissen and Sydow
1917. Annal. Mycol. 15:47. Pro Parte, teleomorpha-
sis only.

=Hyalocapnias Batista and Ciferri
1963. Saccardo 2:114. Pro Parte, teleomorphosis
only.

=Leptocapnodium Batista and Ciferri
1963. Saccardo 2:121. Pro Parte, a nomen confusum.

=Leptocapnodium Batista and Ciferri emend. Hughes
1976. Mycologia 68:776-777. Pro Parte, teleomorpha-
sis only.

NOMEN HOLOMORPHOSIS SPECIES:

- Scorias spongiosa (von Schweinitz) Fries
1829. Systema Mycologicum 3:291 emend. Reynolds

TELEOMORPHOSIS: Ascospores hyaline, fusiform, 15-19 μ x 5-6 μ , with 3 transsepta; Ascus bitunicate, 55-60 μ in length, nasse apicale present at apex of inner wall; Ascus Wall Kohn-Korf (IKI-KOH) reaction positive; Hymenium basal in locule, surrounded by wall comprised of textura angularis tissue; Locule Wall internally appendaged with periphysoids which are branched, septate, hyaline, and are present or absent at ascocarp maturity; Locule Wall externally appendaged with subtending stalk, forming cylindrical column measuring 100-300 μ x 25-50 μ ; Ascocarp containing a single locule, ostiolate, borne on stroma surface projections, measuring 90-140 μ x 75-100 μ .

NOMEN ANAMORPHOSIS: Incertus.

ANAMORPHOSIS: Conidium unicellular, 8-10 μ x 2-8 μ , hyaline; conidiogenous cell enteroblastic, monophialidic or rarely not; conidiophores acropleurogenous, branched, hyaline, borne basally and laterally in cavity surrounded by walls comprised of textura prismatica tissue; Anamorphic centrum borne internally or terminally from rostrate outgrowths on stromal surface; Fruit body ostiolate, ostiole acolluminate or with a neck measuring 35-40 μ x 75-300 μ , which is fimbriate or not.

Type specimen. FH., (ex. Herbarium Curtis), (ex. Herbarium L. D. von Schweinitz). No collection data available.

NOMINA SYNONYMA SPECIES:

- (Basionym) Botrytis spongiosa von Schweinitz
1822. Schrift. naturf.-Ges., Leipzig 1:127. Pro Parte
teleomorphosis only.

=Scorias spongiosa (Schw.) Ellis and Everhart
1892. The North American Pyrenomycetes. Privately
published. Newfield, New Jersey. P. 55. Pro Parte,
teleomorphosis only.

=Scorias spongiosa (Schw.) Fr. var. longipendiculata
Batista and Ciferri
1963. Saccardo 2:192.

SPECIES IMPERFECTLY KNOWN:

- Capnodium caroliniense Berkeley and Desmazieres
1849. J. Roy. Soc. London 4:252-253.

- Capnodium expansum Berkeley and Desmazieres
1849. J. Roy. Soc. London 4:253.

SPECIMENS EXAMINED

Adams, J. F. --USA, Pennsylvania, Curtis County, Bear Meadows: 17 X 1919: Alnus: CUP30541, (Pennsylvania State College Department of Botany); LAM201632: Scorias spongiosa.

Anonymous --USA, Ohio: III: K, (Herb. M. J. Berkeley 145, in 1879); LAM200675: Scorias spongiosa. --USA, Ohio: K. (Herb. M. J. Berkeley in 1879); LAM200674, LAM 200676, UPS, (Herb. M. J. Berkeley), (Herb. E. Fries); LAM 200670, LAM200671: Scorias spongiosa. --USA, Pennsylvania: UPA, (Lenarmand); LAM200672, LAM200671: Scorias spongiosa. --Alnus: BPI; LAM201458. This is the only record known to me from the western USA. The published specimen data is regarded as unreliable. The specimen was published in Batista and Ciferri (1963) page 188 with the data, "Brown, W. H.: USA, Washington, Sellick: XII 1932." A note in the specimen packet indicates that the collection was sent by a Washington State Agriculture Department employee to V. K. Charles, who determined it as Scorias spongiosa. The sender had received the collection from Brown without collection data. Fagi and Alni: E, (Fungi Cardini 81); LAM201453: Scorias spongiosa. --FH*, (Herb. Curtis), (Herb. L. D. von Schweinitz); LAM200749: Scorias spongiosa. --E; LAM201452: Scorias spongiosa.

Banker, H. J. --USA, Pennsylvania, California: 22 III 1904: NYS, (Herb. Howard J. Banker); LAM201588: Scorias spongiosa.

Bigelow, M. E. B. #950: USA, Michigan, Cheboygan County, University of Michigan Biological Station, Camp area; 12 VII 1953: Pinus strobus: MASS; LAM201596: Scorias spongiosa. --#2671 and H. E. Bigelow: USA, Massachusetts, Conway, Baptist Hill: 24 V 1960: MASS; LAM 201599: Scorias spongiosa. --#4605 and H. E. Bigelow: USA, Vermont, Mount Mansfield State Forest, Little River area: 30 VIII 1964: Alnus: MASS; LAM201591: Scorias spongiosa.

Bird, Henry: USA, New York, Rye: XII 1911: Pine: NYS; LAM201576: Scorias spongiosa.

Brower, A. E.: USA, Maine, Wesley: XII 1934: Alnus: CUP25228; LAM201633: Scorias.

Burnham, Stewart H.: USA, New York, Washington County, east of Tripoli, along Halfway: VIII 1896: Alnus incana: CUP22844, (Flora of Lake George Region, New York); LAM201616: Scorias spongiosa. --USA, New York, Washington County, Southern W. Fort Ann, south bank of Tripoli pond: 16 III 1916: Alnus incana: CUP22191, (Flora of Lake George Region, New York); LAM201615: Scorias spongiosa. --USA, New York, NE of Forest Home: 12 XI 1904: CUP22845, (Flora of Cayuga Lake Basin, New York); LAM201623: Scorias

spongiosa. --USA, New York, Ithaca, Six Mile Creek: 27 III 1905: Fagus: CUP22933, (Flora of Cayuga Lake Basin, New York); LAM201619: Scorias spongiosa. --USA, New York, Southern W. Fort Ann, east of Tripoli, Halfway Brook: 20 X 1914: Alnus incana: CUP22603, (Flora of Lake George Regions, New York); LAM201624: Scorias spongiosa.

Clinton, G. W.: USA, New York, Buffalo: VIII 1871: Alnus incana: BUFF45455; LAM201610: Scorias spongiosa. --USA, New York, Buffalo: 3 X 1871: BUFF45458; LAM201613: Scorias spongiosa. --USA, New York, Springville: X 1873: BUFF45457; LAM201612: Scorias spongiosa. --Sp. 1873: Beech: BUFF45456; LAM201611: Scorias spongiosa.

Codding, G. M.: USA, New York, New York City: II 1917: Fagus?: MASS2111; LAM201600: Scorias spongiosa.

Coker, W. C.: USA, North Carolina, Chapel Hill: 1903 Beech: CUP; LAM201639: Scorias spongiosa.

Cooke, W. B. #2157: USA, Ohio, Hamilton County, Newtown Woods: 24 III 1933: Fagus grandiflora: OSC13988; LAM201604: Scorias spongiosa. --#17064 and V. G. Cooke: USA, Virginia, Prince William County, Manasses, near Ravenwood: "5-6-45": Beech: CUP, (Mycobiota of North America 171); LAM201629. WS21294; LAM201607: Scorias spongiosa. --#38253 and V. G. Cooke: USA, Ohio, Hocking County, Old Man's Cave State Park: 26 XI 1966: MASS; LAM201603: Scorias spongiosa.

Davis, W. H.: USA, Massachusetts, Amherst, Gun Club, The Notch: 30 V 1939: Pinus strobus: MASS; LAM201594: Scorias spongiosa.

Diehl, W. W.: USA, Virginia, Dead Run: IV 1924: Fagus americana: BPI; LAM201438: Scorias spongiosa.

Dimetrio, C. H.: USA, Missouri, near Perryville: Vere 1884: Fagi obducens: III, (Rabenhorst-Winter Fungi Europaei 3052); LAM200632: Scorias spongiosa.

Dudley, W. R.: New York, Ithaca, Six Mile Creek: 5 X 1889: Fagus: NYS; LAM201579: Scorias spongiosa.

Everhart, B. M.: USA, Pennsylvania, West Chester: VI 1884: Beech: CUP, (North American Fungi 1363a); LAM 301638. ILL; LAM200629. MASS, (North American Fungi 1363a); LAM201593. OSC35309, (North American Fungi 1363a); LAM201606. URM4821, North American Fungi 1363a); LAM 201442: Scorias spongiosa. --USA, Pennsylvania, West Chester: X 1885: Beech: CUP, (North American Fungi 1363b); LAM201637. ILL, (North American Fungi 1363b); LAM 200628. MASS, (North American Fungi 1363b); LAM201592. OSC35308, (North American Fungi 1363b); LAM201605; Scorias spongiosa.

Fitzpatrick, H.: USA, Pennsylvania, Center County, Bear Meadows: "6-12-1920": Alnus incana: CUP, (Fungi collected by Cornell University Plant Pathology, New York Botanical Garden, Pennsylvania State College Department of Botany, Syracuse University Department of Botany 68); LAM 201631: Scorias spongiosa. --and Roon: USA, New York, near Ithaca, Gorge at Enfield Falls: V 1920: Hemlock: CUP11132; LAM201614: Scorias spongiosa.

Fullerton, D. H.: USA, Maryland, Mitchellville: 2 III 1918: Fagus: CUP30540, (Plant Pathology, New York State); LAM201625: Scorias spongiosa.

Fultz, S.: USA, Massachusetts, South Amherst: 28 V 1970; Pinus strobus: MASS; LAM201595: Scorias spongiosa.

G., H. E.: USA, New York, Ithaca, Coy Glen: V 1885: Beech: CUP20591, (Herb. William R. Dudley), (Flora Cayuga Lake Basin, New York); LAM201618: Scorias spongiosa.

House, H. D.: USA, Essex County, Minerva, Upper Minerva Brook: 3 X 1927: Alnus incana: NYS, LAM201581: Scorias spongiosa.

Hungerford, R.: USA, New Hampshire, Grafton County, Littleton, one mile north: 11 VIII 1967: Pinus strobus: WS57475; LAM201608. WS57728; LAM201609: Scorias spongiosa.

Luttrell, E. S.: USA, Georgia, Athens, University of Georgia campus: 18 VIII 1973: Fagus grandiflora: LAM 200000. --USA, Georgia, Athens, University of Georgia campus: 25 X 1971; Fagus grandiflora: LAM200001. --USA, Georgia, University of Georgia campus: 2 II 1972: LAM 200002. --USA, Georgia, Athens, University of Georgia campus: 9 II 1972: Fagus grandiflora: LAM200003. --USA, Georgia, University of Georgia campus: 12 XI 1971: Fagus grandiflora: LAM200004. --USA, Georgia, Athens, University of Georgia campus: 20 II 1972: Fagus grandiflora: LAM200005. --USA, Georgia, Athens, University of Georgia campus: 02 XII 1971: Fagus grandiflora: LAM200006. --USA, Georgia, University of Georgia campus: 20 XII 1971: Fagus grandiflora: LAM200007. --USA, Georgia, Athens, University of Georgia campus: 21 I 1972: Fagus grandiflora: LAM200008. --USA, Georgia, University of Georgia campus: 05 IV 1972: Fagus grandiflora: LAM200009. --USA, Georgia, Athens, University of Georgia campus: 24 IV 1970: Fagus grandiflora: LAM200010. --USA, Georgia, Athens, University of Georgia campus: 11 V 1972: Fagus grandiflora: LAM200011. --USA, Georgia, Athens, University of Georgia campus: 11 V 1970: LAM200012. --USA, Georgia, Athens, University of Georgia campus: 10 V 1973: Fagus grandiflora: LAM200013. --and M. E. B. Bigelow 6184: USA, Georgia, Athens, University of Georgia campus: 22 III 1974: Fagus grandiflora: MASS; LAM201601: Scorias spongiosa.

Mackworth, G. D. #728: USA, Louisiana, Bogalusa:
13 II 1926: Pinus glabra: BPI*: Capnodium.

Manning, M. F.: USA, New York, New York City, Landscape Foresters Ltd.: Pinus strobus: NYS; LAM201575: Scorias spongiosa.

Overholts, L. O.: USA, Pennsylvania, Hutingdon County: 5 IX 1921: Tsuga canadensis: URM5158, (BPI); LAM201446.

Peck, C. H.: USA, New York, Wells: 19 IX 1904: NYS; LAM201585: Scorias spongiosa. --USA, New York, Ulster County, Barrytown: 26 VI 1908: Chestnut: NYS; LAM201590: Scorias spongiosa. --USA, New York, Elizabethtown: VI: Alnus rugosa: NYS; LAM201582: Scorias spongiosa. --USA, New York, Albany County, Karner: Alnus rugosa: NYS; LAM 201584: Scorias spongiosa. --and G. W. Clinton: USA, New York, Albany and Buffalo; NYS; LAM201583: Scorias spongiosa.

Ravenel, H. W.: USA, South Carolina, Aiken: Alni: BPI, (Fungi Americani Exsiccati 334); LAM201459. CUP; LAM 201636. E; LAM201454, LAM201455: Scorias spongiosa. --USA, South Carolina: XII: Alni: K, (Herb. M. J. Berkeley); LAM200677: Scorias spongiosa. --USA, South Carolina, Aiken: Alni: ILL, (Fungi Americani Exsiccati 187); LAM200631: Scorias spongiosa. --Fagus sp.: URM 4817, (NY), LAM201443.

Reddick, Donald: Summer, 1905: CUP35890, (Flora of Cayuga Lake Basin, New York 230); LAM201630: Scorias spongiosa.

Rogers, D. P.: USA, Illinois, Shawnee National Forest: 14-15 III 1958: ILL; LAM200618: Scorias spongiosa.

Schuster, R.: USA, North Carolina, Greensborough: Winter, 1956-1957: Beech: MASS; LAM201598: Scorias spongiosa.

Seaman, W.: USA, Washington, D.C.: 1875: Fagus americana: B, (DeThumen, Mycotheca Universalis 967); LAM 201038. ILL; LAM200630. NYS; LAM201573. URM4822; LAM 201444: Scorias spongiosa.

Seaver, F. J. and Carlos E. Chardon: Puerto Rico, Mayaguez: 24 I - 5 IV 1923: Palm: CUP, (New York Botanical Garden, Department of Agriculture and Labor of Porto Rico, West Indian Exploration 405), (Explorations of Porto Rico 1670); LAM201635; Scorias spongiosa--This misdetermination is noteworthy because of the tropical locale).

Schallert, P. O.: USA, Forsyth County, Nifong Rock: "3/15-1936": Beech: VT7885, (Herb. P. O. Schallert); LAM

201572: Scorias spongiosa.

Shear, C. L.: USA, Florida, Gainesville: 21 II 1920: BPI, (FLAS46426); LAM201998. URM5144, (BPI); LAM201445: Scorias spongiosa. --USA, Maryland, Tacoma Park: 2 I 1903: Alnus: BPI; LAM201457. --USA, Virginia Fairfax: 4 X 1935: Betula: BPI; LAM201437.

Sherwood, M. A.: USA, New York, Tompkins County, Cornell University campus, near Beebe Lake: 21 I 1977: Alnus: CUP55854; LAM201034: Scorias spongiosa.

Smith, Erwin F.: USA, Maryland, Caroline County: 23 I 1891: Alnus: BPI1599; LAM201456: Scorias spongiosa.

Smith, Stanley J. #12884: USA, New York, Albany County, Albany: 23 XI 1952: NYS; LAM201588: Scorias spongiosa. --#14820 and W. M. Mansfield: USA, New York, Albany County, Meadowdale, Alnus swamp: X 1953: NYS; LAM 201587: Scorias spongiosa. --#15611: USA, Florida, Wakulla County, Wakulla Crossing: 29 III 1954: Hardwood: NYS; LAM201574: Scorias spongiosa. --#16155: USA, Alabama, Sumter County, NE of Cuba: 2 IV 1954: NYS; LAM 201589: Scorias spongiosa. --#27177, Gary E. Larson and Thomas H. Matthews: USA, Caldwell, 3 miles west: 25 VIII 1958: Pinus strobus: NYS; LAM201578: Scorias spongiosa. --#40918 and Robert Cote: USA, Saratoga County, East Galway vicinity: 8 XI 1966: Osmunda regalis var. spectabilis: NYS; LAM201580: Scorias spongiosa.

Van Denburg, M. W.: USA, Mt. Vernon: Liriodendron tulipifera: NYS; LAM201577: Scorias spongiosa.

Von Schweinitz, L. D.: USA, North Carolina, Salem, Bethlehem: P, (Herb. L. D. von Schweinitz), (Syn. Fungi 3077-1); LAM201440: Scorias spongiosa. --Fagus betle: BPI; LAM200673, LAM201441. UPS; LAM200673: Scorias spongiosa.

West, Erdman #3548: USA, Florida, Fairbanks: 2 II 1927: Alder: FLAS1864; LAM201448: Scorias spongiosa. --#9949: USA, Florida, St. Johns County, Pellicier Creek: "2.10, 1935": Black Alder: FLAS1862; LAM201449: Scorias spongiosa. --: USA, Florida, Clay County, Penny Farms: 31 I 1939: Alnus rugosa: FLAS21140; LAM201450: Scorias spongiosa. --#11595 and Lillian Audd: USA, Florida, Gainesville, Newmans Lake: 15 I 1937: Alnus: FLAS21183; LAM201447: Scorias spongiosa. --and Lee O. Overholts: USA, Pennsylvania, Seven Mountains, Greenlee Mountain: 17 III 1918: Black Alder: FLAS1863, (The Pennsylvania State College Department of Botany 54); LAM201451: Scorias spongiosa.

Whetzel, H. H.: USA, New York, Ithaca, Enfield Gorge: 22 X 1904: Beech: CUP2083; LAM201627: Scorias spongiosa. --USA, New York, McLean Preserve: 20 X 1935: CUP25015; LAM201626: Scorias spongiosa. --Cotton, Pethybridge, Uanjer: USA, New York, Ithaca: 7 VII 1919: Alnus incana: CUP1223; LAM201628; Scorias spongiosa. --Muen-scher, White, Niederhauser: USA, Virginia, Fredericksburg, 20 miles north: 1 IV 1940: CUP28996; LAM201621: Scorias spongiosa. --and L. White: USA, New York, McLean, Lloyd Preserve: 28 III 1835: Alnus incana: CUP24916; LAM201617: Scorias spongiosa. --and L. White: USA, New York, Lloyd Preserve: 28 IV 1935: CUP24695; LAM201620: Scorias spongiosa.

Wilson, Donald: USA, Massachusetts, West Acton: 15 I 1956: Pinus strobus: MASS; LAM201597: Scorias spongiosa.

Wolf: USA, Illinois, Canton: ILL6623; LAM200619: Scorias spongiosa.

DISCUSSION

I (Reynolds, 1978a) used collections of sequentially produced ascocarps from a natural habitat to establish that the anamorphosis of Scorias spongiosa underwent several morphological expressions. Several extant generic names could be applied to the range of anamorphic expression I found involving a single anamorphic centrum. A similar range of pycnidial forms I reported for S. spongiosa could be individually found in various collections of Scorias utilized in this study, along with other non-pycnidial asexual forms. However, the assumptions I made of the holomorphic reproductive states of S. spongiosa are not transferable to other species in the genus for several reasons. I did not report confirmation of the observations on field-derived specimens with data derived from pure culture isolates. More importantly, the collections utilized were randomly obtained by various collectors over a period of time from many localities. Consequently, positive proof of a biological connection between any teleomorphosis with any anamorphoses was impossible to ascertain. In my experience, these same pycnidial (and non-pycnidial) forms are also to be found in many other sooty mold Ascomycete collections where the Scorias teleomorphosis is unknown.

NOMEN HOLOMORPHOSIS SPECIES:

Scorias brasiliensis (Puttemans) Reynolds
1971. Bull. Torrey Bot. Club 98:151.

TELEOMORPHOSIS. Ascospores hyaline, fusiform, 12-17 μ x 3-6 μ , with three transsepta; Ascus bitunicate, obclavate, 30 μ in length; Ascus Wall Kohn-Korf (IKI-KOH) reaction positive, nasse apicale present at apex of inner

layer; hymenium basal in locule; Locule Wall internally appendaged with periphysoids which are branched, septate, hyaline and present or absent at ascocarp maturity; Locule Wall externally appearing as *textura angularis*, externally appendaged with subtending stalk which forms a cylindrical column measuring 100-150 μ x 30-60 μ ; Ascocarp ostio- late, containing a single locule, 60-80 μ x 60-80 μ .

ANAMORPHOSIS: Incertus.

Type specimen. RBR*: Puttemans, A. #337: Brasil, São Paulo, Horto Botânico: 27 VIII 1902: Coffee.

NOMINA SYNONYMA SPECIES:

(Basionym) Capnodium brasiliensis Puttemans
1904. Bull. Soc. Mycol. Fr. 20:153. Pro parte, teleo- morphosis only.

=Paracapnodium brasiliense (Puttemans) Spegazzini
1918. Physis 4:228. Pro parte, teleomorphosis only.

=Leptocapnodium brasiliense (Puttemans) Batista and Ciferri
1962. Saccardoia 2:122. Pro parte, teleomorphosis only.

=Capnodium usterii Rehm
1907. Ann. Mycol. 5:521. Pro parte, teleomorphosis only.

=Antennella usterii (Rehm) Theissen and Sydow
1917. Ann. Mycol. 15:473. Teleomorphosis only.

=Capnodina usterii (Rehm) Spegazzini
1918. Physis 4:287. Pro parte, teleomorphosis only.

=Scorias paulensis P. Hennings
1908. Hedwegia 48:6. Pro parte, teleomorphosis only.

=Hyalocapnias amorimii Batista
1963. Saccardoia 2:114-116. Pro parte, teleomor- phosis only.

=Antennellina hawaiiensis Mendoza emend. Batista and Ciferri
1963. Saccardoia 2:60-61. Pro parte, teleomorphosis only. A redescription based on a Trinidad collec- tion misconstrued as the holotype.

NON Antennellina hawaiiensis Mendoza
1925. B. P. Bishop Mus. Bull. 19:55-56.

=Blastocapnias citricola Batista and Ciferri
1963. Saccardo 2:68. Teleomorphosis only.

=Blastocapnias verrucosa Batista and Ciferri
1963. Saccardo 2:69-70. Teleomorphosis only.

EXCLUDED SPECIES

Antennella capsulifera Rehm sensu Ciferri and
Batista
1963. Saccardo 2:59.

This species is a Trichomerium as circumscribed from
Capnodium capsuliferum Rehm (1907); the Rehm concept was
based on discordant elements.

SPECIMENS EXAMINED

Amorim, Washington: Brasil, Pernambuco, Vitoria:
Cocos nucifera: URM2741*; LAM200565: Hyalocapnias
amorium+

Fraser, L. R.: Australia, New South Wales, Bulga:19
I 1934: Lyonia strammea: IMI26119; LAM200979. DAR; LAM
200778: Scorias philippensis.

Freire, J. R. Jardim: Brasil, Rio Grande do Sul,
Venancio Aires: 13 V 1947: Citrus sinensis: URM9048,
(SFPA3887); LAM200499: Capnodium.

Puttemans, A. #337: Brasil, Sao Paulo, Horto Botan-
ico: 27 VIII 1902: Coffee: RBR*; LAM200711: Limacinia
coffeicola. --#1270: Brasil, Sao Paulo: V 1905:
Justica: S*, (Herb. Sydow); LAM200810: Scorias paulensis.

Silva, M. A.: Brasil, Camaragibe: Citrus lineata:
URM2743*; LAM200863: Blastocapnias citricola+

Silva, S. J.: Brasil, Pernambuco, Recife, Beberibe:
18 IV 1956: Centella asiatica: URM2802*; LAM200864:
Blastocapnias verrucosa+

Stevens, F. L.: Trinidad, Long Stretch: 13 VIII
1922: Tabebuia: BISH*; LAM202070: ILL6628; LAM200592:
Antennellina hawaiiensis+

NOMEN HOLOMORPHOSIS SPECIES:

Scorias philippensis Mendoza emend. Reynolds
1932. Phil. J. Sci. 47:289-290. Pro parte, teleomorpho-
sis only.

TELEOMORPHOSIS: Ascospores hyaline, cylindrical,
tapering at one end, 19-28 µ x 3-6 µ with 3 transsepta;
Ascus bitunicate, cylindrical to clavate, 40-50 µ in
length; Ascus Wall Kohn-Korf (IKI-KOH) reaction positive,

nasae apicale present at apex of inner wall; hymenium basal in locule, surrounded by wall comprised of textura angularis; Locule Wall internally appendaged with periphysoids which are branched, septate, hyaline, present or absent at ascocarp maturity; Locule Wall externally appendaged with subtending stalk, forming cylindrical column measuring 62-100 μ x 62-118 μ ; Ascocarp containing a single locule, ostiolate, 75-108 μ x 50-118 μ .

ANAMORPHOSIS: Incertus.

Type specimen. Location unknown. Ramos, M. and D. Derooy: Philippines, Batangas; IV or V 1915: Ficus hauile: Philippine Bureau of Science 22672. Lectotypes: BPI: Hanser, J. S.: Cuba: X 1907: Psidium guajava. URM 5263: Rands, R. D.: Java: VI 1919: Pyrus malus.

NOMEN SYNONYMY SPECIES:

=Hyalocapnia psidii Batista and Ciferri
1963. Saccardoia 2:114-117. Pro parte, teleomorphosis only.

SPECIMENS EXAMINED

Hanser, J. S.: Cuba, Santrope de Las Vegas: X 1907: Psidium guajava; URM5263, (BPI); LAM200936: Hyalocapnia psidii+

Rands, R. D.: Java: VI 1919: Pyrus malus: URM 5251; LAM200937: Hyalocapnia psidii.

DISCUSSION

The larger ascospore size distinguishes this species from others in the genus Scorias. The tropical species published by Batista and Ciferri (1963) as Hyalocapnia psidii belongs here. The Australian record of Scorias philippinensis established by Fraser (1935) is updated as S. brasiliensis. I cannot yet locate holotypic material of S. philippinensis. The Philippine Bureau of Science duplicates were routinely distributed to many herbaria and the likelihood of the existence of an isotype is good; none exists in any herbarium in the Philippines. Additional field work should yield more definitive material. I can locate only two collections which fit within the accepted species concept. Consequently I intend the designation of lectotypes to only temporarily supplant the holotype and deliberately designate two collections in order to emphasize this attitude. One collection does not have precedence over the other as a syntype because of the order in which they are listed. However, I did use the Hanser and the Rands collections to determine the presence of periphysoids and for the Kohn-Korf reaction.

SCORIAS SPECIES IMPERFECTLY KNOWN:

Capnodium tanakae Shirai and Hara
1916. in Hara, K. A discourse on fruit diseases. p. 239.
This species was described as having cylindric and simple to branched ascocarps with fuscous three septate ascospores. Sawada (1929) and Yamamoto (1954b) redescribed this species based on Taiwan material instead of the Japanese type. The holotype in TNS is badly damaged. The original description and Tanaka's (1920) English translation of the description suggests a Scorias species closely related to the other temperate species, S. spongiosa.

Neocapnodium theae (Hara) Hara
1959. in Yamamoto, W., Sci. Reports Hyogo Univ. Agri., Agri. Biol. Ser. 4:20. The basionym of this species (Hara, 1931) is Capnodium theae Hara; a later synonym is Capnodaria theae Hara (Hara, 1931). Yamamoto (1959b) considered the species to be related to those in Neocapnodium, differing in the elongated ascospores. This name is not associated with Capnodium theae Boedijn (1931).

Scorias citrina (Hara) Yamamoto
1959. Sci. Reports Hyogo Univ. Agri., Agri. Biol. Ser. 4:20. Antennella citrina Hara (1931) is the basionym of this combination. No holotype could be found in the Hara herbarium now located in TNS. Yamamoto (1959b) cited no new collections. The Hara (1931) description of the species is an insufficient basis for reassessment.

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STUDIES ON THE LEPHOTACEAE OF THE PACIFIC COAST REGION. I. TWO NEW SPECIES

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SUMMARY

A brief survey of pertinent literature on the species of *Lepiota sensu lato* encountered on the western slope of the Pacific Coast States is presented, and two new species--*Lepiota glabridisca* and *Lepiota oregonensis*--are described.

The first report on the Lepiotaceae of the Pacific Coast region was that of Harkness and Moore (1880) who listed five *Lepiota* species as *Agaricus*. Murrill (1912) recorded 21 species, 15 of which were described as new; one has since been transferred to *Cystoderma* (Smith and Singer, 1944). Zeller later (1922, 1929, 1933, 1934, 1938) reported six new species and several new records from Oregon. Additional distribution records and another four new taxa were recorded by Kauffman (1924, 1929), Smith and Rea (1944), Burlingham (1945), and Smith (1949). The only recently published works on Lepiotaceae of the Pacific Coast are those of Sundberg (1967, 1971a, 1971b, 1976).

Because of the paucity and scattered nature of available information, these studies were initiated to more

fully document all the species of *Lepiota sensu lato* known to occur on the western slope of the Pacific Coast States. In this paper, two new species are described. Colors in quotation marks are from Ridgway (1912). Where employed, herbarium abbreviations are from Holmgren and Keuken (1974).

LEPIOTA GLABRIDISCA Sundberg, sp. nov.

Figs. 2, 3

Pileus 1.5-4.2 cm latus, convexus demum plano-convexus, perumque umbonatus, udus demum siccus, demum rimosus, glaber, obscure rufo-brunneus vel vinaceo-brunneus, ad marginem pallide cinnamoneus; sapor amarus. Lamellae liberae, albae. Stipes 3-8.5 cm longus, 2-5 mm crassus, albus, glaber; annulus subapicalis, albus, ad marginem brunneus. Sporae (6.3-)7.0-9.5(-10.3) x 4-4.8 (-5.5) μ m, subellipsoideae. Cheilocystidia (21-)27-45(-54) x 6-10 μ m, clavata vel ventricosa. Holotypus in Herbario San Francisco State University conservatum est: legit prope Patrick's Point State Park, Humboldt Co., California, Sundberg 888, Oct. 9, 1966.

PILEUS 1.5-4.2 cm broad, initially convex, becoming plano-convex to plane, then uplifted, usually umbonate; margin slightly incurved at first, then decurved, becoming plane, entire at first, rimose to eroded in age, striate where not covered by the cuticle; surface dry to moist, rarely subviscid; cuticle initially continuous and glabrous throughout, remaining so on the disc, becoming radially diffracted and exposing the white flesh toward the margin, infrequently appearing appressed scaly due to partial disruption of the radially arranged cuticular strips, often receding from the margin; disc rarely appearing hygrophanous, dark reddish brown ("vandyke brown" to "warm sepia") to dark vinaceous brown ("natal brown") to reddish brown ("rood's brown") to orange-brown ("mikado brown"), paler ("army brown" to "avellaneous" or "cinnamon" to near "pinkish buff") toward the margin.

FLESH 1-3 mm thick, compact but soft, white, unchanging. Taste bitter. Odor not distinctive.

LAMELLAE free, approximate to remote, some forking or anastomosing or both near the stipe apex; white to pale cream ("cartridge buff"), unchanging; close; thin; margin minutely fimbriate, concolorous. Lamellulae in one to two tiers, sometimes anastomosing with the lamellae.

STIPE 3.0-8.5 cm long, 2-5 mm wide at the apex,

enlarged below to distinctly clavate; surface dry, glabrous throughout; white, sometimes slightly yellowish near the base, becoming sordid upon handling; stuffed, becoming hollow, pith fibrils white, cortex white to slightly darker, both unchanging.

ANNULUS superior, sometimes appearing movable, sheathing below and flaring to appressed against the stipe above, membranous, thin and fragile, white above and below with a dark reddish brown to cinnamon lower margin.

BASIDIOSPORES white in mass; (6.3-)7.0-9.5(-10.3) x 3.9-4.8(-5.5) μm , ovoid to ellipsoid, often tapered toward the apex and with a convex apical protrusion, inequilateral in lateral view, smooth; thick-walled as seen in cresyl blue, more so at the apex, apical pore lacking, the apical region appearing paler and somewhat differentiated in Melzer's reagent; uni- to biguttulate, rarely granulose; hyaline to pale yellowish green in KOH, dextrinoid (pale to dark reddish brown) in Melzer's reagent. BASIDIA 20-31 (-36) x 6-10 μm , clavate, mostly 4-spored, rarely 1- to 2-spored, finely granulose, hyaline in KOH and Melzer's reagent. CHEILOCYSTIDIA (21-)27-45(-54) x 6-10 μm ; abundant; clavate to ventricose, often rostrate, apices rounded to subacute, bases frequently narrow and elongate; thin-walled and sometimes flexuous, rarely appearing faintly encrusted toward the midregion, hyaline in KOH and Melzer's reagent. PLEUROCYSTIDIA absent. LAMELLAR TRAMA loosely interwoven, some hyphae with a granular incrustation on the walls, hyaline in KOH and Melzer's reagent, oleiferous hyphae present. PILEAL TRAMA loosely interwoven, more compact and radially arranged toward the cuticle, hyaline in KOH, hyaline to pinkish or tinged pale orange in Melzer's reagent, oleiferous hyphae present. CUTICLE appearing two layered on the disc; the upper layer irregularly and sometimes loosely interwoven, frequently appearing gelatinous, thinner and often scattered in patches or absent toward the margin, cells somewhat thinner than those of the lower region, walls thin, not encrusted, some with a pale yellowish brown content, hyaline to pale yellowish brown in KOH and Melzer's reagent; the lower layer more or less radially interwoven, cells elongate, wider than those of the superficial region, often anastomosing, walls frequently encrusted, pale to dark yellowish brown in mass in KOH and concolorous to dark brown or pale to dark reddish brown in Melzer's reagent. CLAMP CONNECTIONS absent.

HABIT AND HABITAT: Solitary to scattered to gregarious in humus under *Picea sitchensis* (Bong.) Carr, *Sequoia sempervirens* Endl., and *Tsuga heterophylla* (Raf.) Sarg.

September to November in northwestern California, western Oregon, and Idaho.

COLLECTIONS EXAMINED: California: Madden 764; Sundberg 434, 452, 768, 786, 787, 888 (HOLOTYPE), 1005; Thiers 14245 (all SFSU). Oregon: H. V. Smith 124, 128a, 165 (all MICH). Idaho: H. V. Smith 8-25-66 (MICH).

DISCUSSION: The smaller size, more fragile nature, dark reddish brown to vinaceous brown tinges, and interwoven cuticle differentiate *L. glabridisca* from *L. rubrotincta* Peck. *Lepiota Glatfelteri* Peck and *L. felinoides* Peck are also similar but lack the two layered cuticle with the irregular and often gelatinous-appearing upper layer.

LEPIOTA OREGONENSIS H. V. Smith, sp. nov.

Fig. 1

Pileus 8-25 mm latus, convexus demum obtuse campanulatus vel plano-expansus, ad marginem appendiculatus, siccus, granulosis demum subsquamulosus, aurantio-cinnamomeus; sapor farinaceus. Lamellae liberae, approximatae, latae, confertae, avariantio maculatae. Stipes 1.5-9 cm longus, 1.5-3 mm crassus, granulosis, aurantio-cinnamomeus, ad basim albidus. Sporae 4-4.8 x 2-2.4 μ m, ellipsoideae. Cheilocystidia 24-42 x 6-10 μ m, fusoides-ventricosa, obtusa vel capitata. Cellulae cuticulae 12-44 μ m diam, tenuitunicatae. Fibulae defunt. Holotypus in Herbario Univ. Mich. conservatum est: legit prope Otis, Lincoln Co., Oregon, H. V. Smith 156, Oct. 10, 1970.

PILEUS 0.8-2.5 cm broad, buttons rounded, nearly globose at first, expanding to obtuse or more or less campanulate and finally nearly plane with a distinct umbo; the margin incurved and somewhat appendiculate from the fibrillose veil at first, becoming uplifted and with a few rather wide radial splits; surface granulose or granulose-warty, the warts or granules larger and more numerous over the disc, becoming finer toward the margin and at times merely slightly granulose at the margin; disc tawny-brown to orange-cinnamon ("mikado brown", "tawny", "russet", "ochraceous-tawny", "orange-cinnamon"), progressively paler--pinkish buff to cinnamon-buff to pale yellowish white to white--toward the margin, in age becoming pale brown over all; warts darkest at the apex.

FLESH thin, white, unchanging or at times becoming



Fig. 1. *Lepiota oregonensis*. H. V. Smith 156. X 4/5.

Fig. 2. *Lepiota glabridisca*. H. V. Smith 165. X 1.

Fig. 3. *Lepiota glabridisca*. Sundberg 888. X 2/3.

pale orange to burnt orange after handling, firm, somewhat watery-sordid in age. Odor fungoid. Taste mildly farinaceous.

LAMELLAE free, approximate at first but becoming more distant from stipe, somewhat ventricose when mature; dull white to pale cream color, becoming watery-sordid in age, in places stained brownish cinnamon or with distinct rusty spots; margins even, concolorous or tinted with pale orange after handling. Lamellulae few.

STIPE 1.5-9 cm long, 1.5-3 mm thick at apex, equal to the base where it may enlarge to 4-5 mm, covered by a gran-

ulose or somewhat warty layer nearly to the apex; apex silky and whitish, below "pinkish cinnamon" to "cinnamon" or somewhat ochraceous-tawny, bruised areas more or less "orange-cinnamon"; thinly hollow with a white fibrillose pith in places, cortex tinted with colors of surface, somewhat watery, "orange-cinnamon" where bruised; in older basidiocarps watery brownish, usually whitish around the base where it is attached to the soil.

BASIDIOSPORES 4-4.8 x 2-2.4 μm , ellipsoid, hyaline to very pale rusty brown in Melzer's reagent, thin-walled. CHEILOCYSTIDIA 24-42 x 6-10 μm , inflated-clavate with a rounded apex, capitate or having 1-4 narrowed constrictions giving rise to a somewhat short moniliform tip with the segments smaller toward the apex, thin walled. PLEUROCYSTIDIA absent. CUTICLE a layer of thin-walled spherical cells 12-44 μm in diameter. CLAMP CONNECTIONS not seen.

HABIT AND HABITAT: Gregarious to caespitose in soil and litter under *Alnus* sp., *Pseudotsuga mezesii* (Mirb.) Franco and *Tsuga heterophylla*. September and October in western Oregon.

COLLECTIONS EXAMINED: Oregon: H. V. Smith 140a, 140b, 156 (HOLOTYPE), 157, 164; A. H. Smith 23426, 24267; Ammirati 5735, 5736, 5761 (all MICH).

DISCUSSION: Sections of dried material prepared for anatomical study produce a pale rusty exudate in KOH. Sectioned material is pale yellowish in KOH with some pale rusty spots on the lamellar margins and in the cutis.

Smith has collected this species over a number of years but has found it abundantly only during one year at the Cascade Head Experimental Forest, near Otis, Oregon.

Lepiota oregonensis differs from *L. rufescens* Lange in its much more orange-tawny colors and its lack of pleurocystidia. *Lepiota fumosifolia* Murrill is also similar but has somewhat larger spores and lacks cheilocystidia.

ACKNOWLEDGEMENTS

The senior author expresses appreciation to Dr. Erich E. Steiner, Director of the University of Michigan Matthaei Botanical Gardens for providing laboratory space to carry out her studies. Photographs of the Smith and Sundberg collections are used through courtesy of the University of Michigan and San Francisco State University Herbaria respectively.

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MYCOTAXON

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NOTES ON *COLLYBIA*. I. *COLLYBIA ALKALIVIRENS*

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In the course of preparing a monograph of New England species of *Collybia*, I have encountered an unusual species that Singer (1948) named *Collybia alkalivirens*. His description is based on holotype material collected in Virginia and a paratype collection from Massachusetts. Examination of these two collections has shown that this agaric has some very distinct characteristics. First of all, in sections of the basidiocarp that are revived and mounted in water, the hyphae of the pileipellis, pileus trama, lamellar trama, and stipitipellis are conspicuously encrusted with a dark brown pigment. Secondly, if an alkaline solution is applied to the sections, the tissues become an intense green color. The reaction of fresh material to alkaline solutions is not known for all the collections studied. However, the field notes on one collection (Gilliam 511, MICH) do indicate that a green reaction occurs when KOH is applied to the fresh pileus and lamellae. Thirdly, the basidiocarps are darkly pigmented when fresh and become dark brown to black when dried.

The examination of additional collections indicates that *C. alkalivirens* is more widely distributed than previously believed and that it also occurs on a greater variety of substrates. *C. alkalivirens* has not been described subsequent to the original publication nor has it been included in any recent discussion or listing of agarics except in Singer (1975). The following description of macroscopic characters of fresh material is adapted from field notes compiled by Dr. H. E. Bigelow. All collections cited are deposited in the Mycological Herbarium of the University of Massachusetts (MASS) except where otherwise

indicated. Capitalized color terms are taken from Ridgway (1912). The terminology used for cortical layers is from Bas (1969) and Singer (1975).

COLLYBIA ALKALIVIRENS Singer, Sydowia 2: 26. 1948.

Collybia plexipes Fr. sensu Kauffman, Agar. Michigan 1: 762. 1918.

Fig. 1 & 2

Pileus 8-27 mm broad, convex or hemispheric with the margin incurved or inrolled at first, expanding to broadly convex or obtusely conic or plane, finally plane with a low broad umbo; margin obscurely rugose-striate or nearly sulcate; surface dull, glabrous, hygrophanous, dark vinaceous-brown when moist (near Carob Brown), fading to rufous on the disc, usually the margin becoming cinnamon to buff with a rufous cast, sometimes only the disc fading, dark brown to black or sometimes buff when dried; flesh thin, very thin at edge of pileus, whitish with a rufous flush; odor and taste none.

Lamellae narrowly adnate to nearly free, close, narrow (0.5-2 mm), equal, soft-textured, more or less glaucous, separable from the pileus, not forked, sometimes intervenose, brown (near Auburn to Bay), fading to chocolate brown, blackish when dry; edges even, straight or slightly undulate.

Stipe 3-6.5 cm long, 1-3 mm thick, equal, fibrous-cartilaginous, straight or curved, centrally attached; surface dull, glabrous except for brownish tomentum at base, dark vinaceous-brown (near Carob Brown) to blackish (near Bone Brown to Clove Brown) and paler at the apex; interior hollow.

Spores white in deposit, 5.4-6.5(8.6) X 2.2-3.2(5.4) μ m, slightly wrinkled in water mounts of herbarium material, smooth and pale greenish in alkali, inamyloid, acyanophilous, pip-shaped to narrowly ellipsoid and inequilateral in profile, ellipsoid to subcylindric in face or back view. Basidia 18.4-27.0 X 5.4-6.5 μ m, clavate to subclavate, four sterigmate, greenish in alkali; siderophilous granules absent. Pleurocystidia absent. Cheilocystidia scattered, inconspicuous, filamentous to clavate with occasionally a few broad obtuse projections, 19.5-72.5 μ m long, green in alkali. Lamellar trama of subparallel to slightly inter-



FIGURE 1. *Collybia alkalivirens* Singer, (Bigelow 12564)
X 1. (Courtesy Dr. H. E. Bigelow)

woven hyphae; cells 4.3-9.7 μm in diam, occasionally inflated to 16.2 μm , with conspicuous spots of dark brown granular encrusting pigment present in water mounts; pigment mostly dissolving in alkali and discoloring the tissues to greenish. Pileus trama loosely interwoven; hyphae branched, 4.3-8.6 μm in diam, slightly encrusted with brown pigment which dissolves in alkali. Pileipellis a layer of repent, branched hyphae, not diverticulate or coralloid, not radially arranged (*i.e.*, a cutis of the "*dryophila* type"); hyphae 3.2-5.4 μm in diam, coarsely encrusted with a brown plate-like pigment which partially dissolves and becomes dark green in alkali solutions. Stipitipellis a layer of parallel, vertically oriented hyphae; cells 3.2-5.4 μm in diam, encrusted, giving rise to long, filamentous to contorted caulocystidia, green in alkali. Clamp connections present in all tissues.

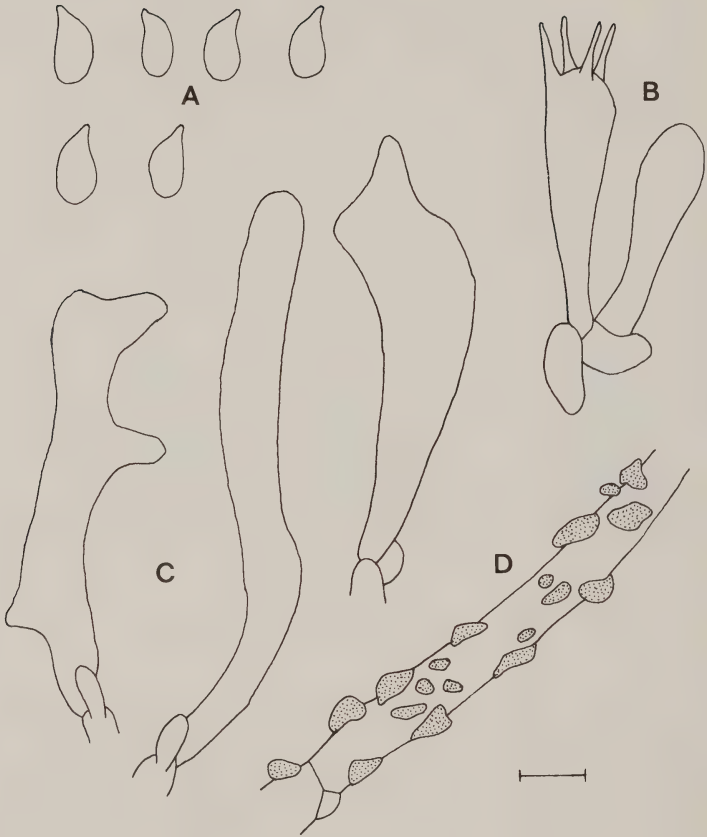


FIGURE 2. *Collybia alkalivirens* Singer. A) Basidiospores. B) Basidium & basidiole. C) Cheilocystidia [from Bigelow 15013]. D) Portion of hypha from lameller trama [from Bigelow 6562]. Standard line = 5 μ m.

Habit, habitat, and distribution: Solitary, scattered, gregarious, or caespitose on soil, among moss, decaying wood debris, or old fern hummocks. Occuring in hardwood forests during June and July in New England, Quebec, Michigan, New York, and Virginia. Also known from conifer forests in Idaho and Oregon during October and December.

Material Examined: CANADA - QUEBEC: Bigelow 5048. U.S.A. - IDAHO: Latah Co. - W. B. Cooke 19024 (MICH). MASSACHUSETTS: Franklin Co. - Smith 84054 (MICH); Bigelow 6741, 9437, 15013. Hampshire Co. - Bigelow 6470, 6471, 6562, 6563, 6564, 6565, 6566, 6567, 6568, 6614, 6849, 7996. Middlesex Co. - Stowe, leg. S. Davis, 1909, PARATYPE (FH). MAINE: Piscataquis Co. - Bigelow 10133, 10192, 10231. MICHIGAN: Cheboygan Co. - Smith 66683 (MICH). Jackson Co. - Mazzer 4782 (MICH). Emmet Co. - Shaffer 1364 (MICH). Gratiot Co. - Potter 4837 (MICH). Luce Co. - Bigelow 786, 902; Smith 41597, 41723 (both MICH). Marquette Co. - Ammirati 4106, 4191, 4288 (all MICH). Washtenaw Co. - Gilliam 511 (MICH); Kauffman, 10 June 1906; Kauffman, 1 June 1912 (both MICH). NEW YORK: Warren Co. - Bigelow 5139. OREGON: Clackamas Co. - Smith 24736 (MICH). VERMONT: Lamaille Co. - Bigelow 12556, 12564, 12864. VIRGINIA: Giles Co. - Singer 337, HOLOTYPE (FH).

Discussion: The affinities of *C. alkalivirens* appear to be with members of Section *Levipedes* (e.g., *Collybia fuscopurpurea* and *Collybia dryophila*), but it is distinct from them because *C. fuscopurpurea* has encrusting pigments which are insoluble in alkali and *C. dryophila* has pigments that are apparently intracellular. *Collybia alkalivirens* is the taxon that Kauffman (1918) called "*Collybia plexipes* Fr. var.", and his two collections cited above were so determined by him. However, according to K  hner and Romagnesi (1953), *C. plexipes* is a *Lyophyllum* with ornamented spores, and Moser (1978) equates *C. plexipes* sensu K  hner and Romagnesi with *Tephroclybe tylicolor* (Fr.) Moser. *Collybia alkalivirens*, of course, lacks siderophilous granules in the basidia and has smooth spores. Lange and Sivertsen (1966) discuss the nomenclature of some rough-spored *Lyophyllum* species, but do not provide a disposition for the Friesian *C. plexipes*.

The two collections from the western United States (Cooke 19024 and Smith 24736) possess spores which are larger (6.5-8.6 X 3.2-5.4 μ m) than is typical for material from the eastern United States, but whether or not this is

significant cannot be determined until more western collections are studied.

Finally it is clear that *C. alkalivirens* is a distinct element in the mycoflora of New England and adjacent areas and is widely distributed. Although the affinities of this taxon are with Section *Levipedes* as currently outlined by Singer (1975), *C. alkalivirens* is somewhat of an anomaly in this section.

ACKNOWLEDGEMENTS

I would like to thank Dr. D. H. Pfister for the loan of type specimens from the Farlow Herbarium, and I also thank Dr. R. L. Shaffer, Director of the Herbarium at the University of Michigan, for the loan of collections and for reviewing the manuscript. In addition, I wish to thank Dr. E. G. Simmons for his advice on Latin and nomenclature, and finally I express my gratitude to Dr. H. E. Bigelow for the use of his notes and his guidance and advice.

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MYCOTAXON

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RECOLTE DE CORDYCEPS INTERMEDIA DANS LES PYRENEES ATLANTIQUES, ESPECE NOUVELLE POUR L'EUROPE

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SUMMARY

A collection of *Cordyceps intermedia* Imai (= *C. valliformis* Mains) was made on August 22, 1978 in the woods near the St. Blaise Hospital, Pyrénées Atlantiques. Known till now only from Japan and eastern North America, it is redescribed here from the French collection.

RÉSUMÉ

Une récolte de *Cordyceps intermedia* Imai, Proc. Imp. Acad. Tokyo 10: 677, 1934, = *C. valliformis* Mains, Bull. Torrey Club 84: 250, 1957, a été faite le 22 août 1978 dans les bois près de l'Hôpital St Blaise - Pyrénées Atlantiques. Ce *Cordyceps* n'a à notre connaissance jusqu'à présent été récolté qu'au Japon, et dans l'Est de l'Amérique du Nord, nous le rédécrivons ici d'après une récolte française.

CARACTÈRES MACROSCOPIQUES

Stroma solitaire avec un long stipe, distinctement capité, globuleux, 5 mm de diamètre, de couleur brun clair, ostioles proéminentes. Stipe 7,5 cm de long × 0,2 cm de large, noir brillant, de consistance cornée (FIG. 1) légèrement furfuracé-silloné et brun clair dans sa partie supérieure (FIG. 2).

CARACTÈRES MICROSCOPIQUES

Couche superficielle du stroma nettement différenciée (FIG. 3-C), composée d'hyphes parallèles, septées, de 25-40 µm de long et 5-7 µm de large, à parois légèrement épaissies se terminant par des cellules arrondies, n'allant pas s'élargissant.

Sous le cortex, chair de textura epidermoidea à textura angularis, composée de cellules de 7 à 10 µm.

Périthèces allongés jusqu'à 1000 × 300 µm de large.

Ostioles proéminentes mais non différenciées des cellules de la surface du stroma.

Stipe composé d'hyphes parallèles de 3,5-5 µm de diamètre (FIG. 3-D). Les hyphes de l'extérieur du stipe se différencient seulement de celles de l'intérieur par leur couleur

¹ A cooperating scientist of the Plant Pathology Herbarium, Cornell University, Ithaca, NY 14853.

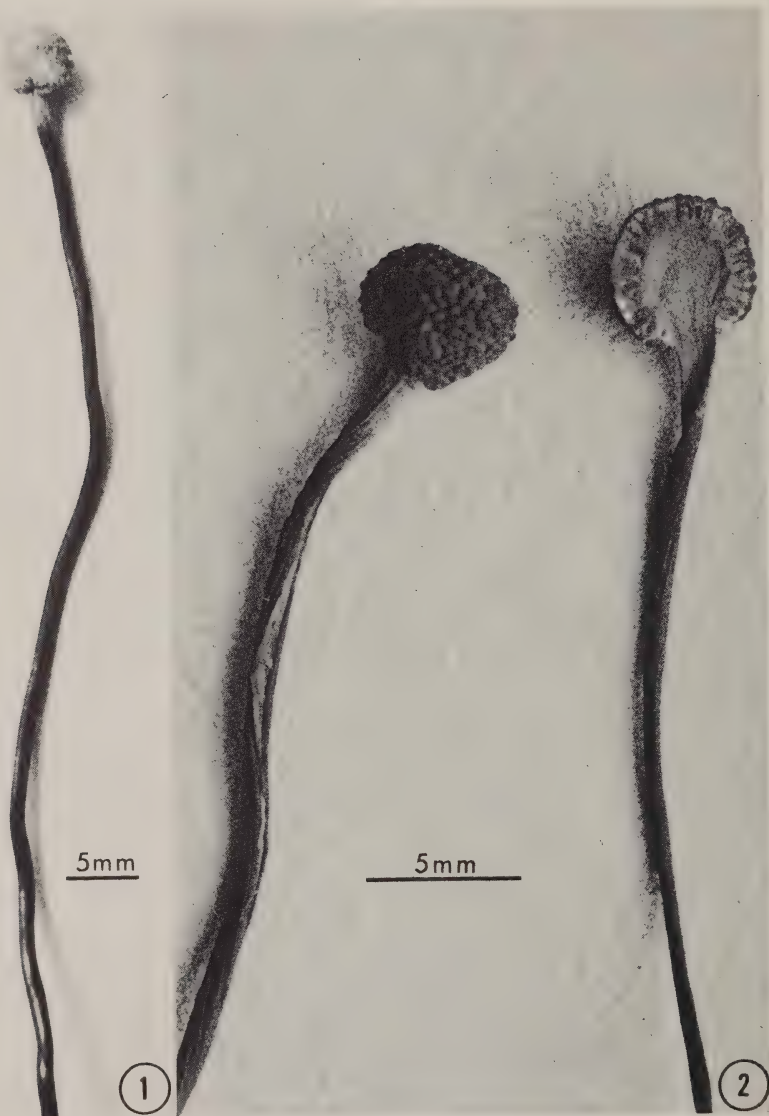


FIG. 1, 2. *Cordyceps intermedia* (Herbier F. Candoussau 4789-2). 1: Carpophore $\times 2$ (photo Guy Roux). 2: à gauche, détail du stroma laissant voir les périthèces saillants ainsi que le haut du stipe sillonné; à droite, en coupe, grandeur des périthèces et de l'intérieur du stipe $\times 4.25$ (photo Emile Jarias).

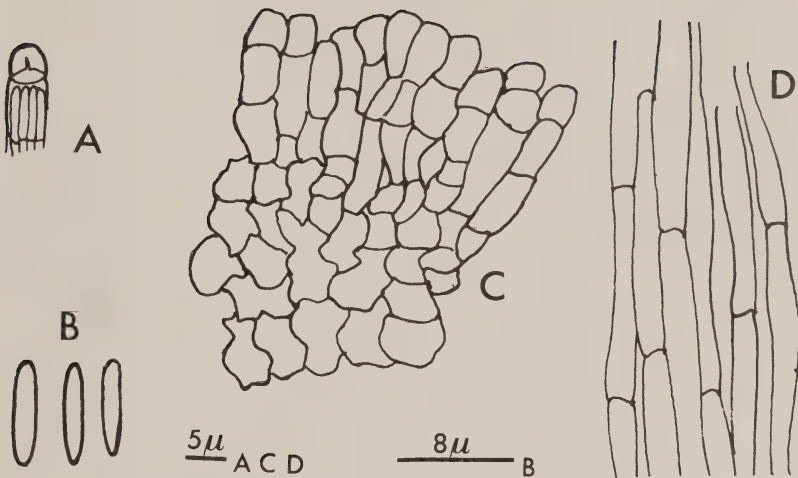


FIG. 3: détails microscopiques. a, haut d'un asque avec spores; b, 3 fragments sporaux; c, couche superficielle et différenciée du stroma; d, hyphes de l'intérieur et de l'extérieur du stipe. (F.C. 4789-2).

brune, leurs mensurations sont identiques.

Asques étroitement cylindriques $250-350 \times 6-7 \mu\text{m}$ à sommet épaissi (FIG. 3-A).

Spores aussi longues que les asques, filiformes, multi-septées. Fragments sporaux unicellulaires, fusiformes de $(7-)$ $8 (-9) \mu\text{m}$ (FIG. 3-B).

HABITAT inconnu.

SPECIMEN EXAMINÉ

France, Pyrénées Atlantiques, bois près de l'Hôpital Saint Blaise, sur le sol, sur *Elaphomyces* ?, Françoise Candoussau et Gary Samuels, 22 août 1978 (Herb. Candoussau 4789-2).

REMARQUE

A la fois *C. intermedia* Imai et *C. valliformis* Mains sont décrit sur *Elaphomyces*, il ne nous a pas été malheureusement possible de retrouver l'hôte de la récolte française.

Notre récolte s'identifie bien à *Cordyceps intermedia* d'après les descriptions de Kobayasi et Shimizu (1960) et Mains (1941, sous le nom de *C. valliformis*) synonymisé par Kobayasi et Shimizu.

DISCUSSION

Notre récolte se différencie de la récolte japonaise par

son stroma plus petit: 5 mm au lieu de 6-12 mm de diamètre; le haut du stipe furfuracé sillonné et non squamuleux; les périthèces proéminents, leur hauteur de 1000 μm au lieu de 450-540 μm ; la forme de ses fragments sporaux fusoides et non cylindriques tronqués; leur mensurations plus grandes: 8,5 μm de moyenne au lieu de 4,5 μm .

Notre récolte est plus proche de la récolte de Mains (1957) décrite *Cordyceps valliformis* par la mensuration du stroma: 3-12 mm de diamètre; la hauteur des périthèces 500-700 μm ; le haut du stipe furfuracé; la dimension des fragments sporaux 3-8 $\times$ 2 μm . Reste en désaccord la forme des spores fusoides, Mains ne les décrit pas clairement et les périthèces proéminents sur notre récolte.

Malgré ces petites différences nous pensons cependant qu'il s'agit bien de *Cordyceps intermedia* Imai.

Ce *Cordyceps* se situe dans le groupe Valliformes minutae entre *C. tenuispora* Mains, espèce à petites spores comme *C. intermedia* (6-8 $\times$ 1-1,5 μm) mais à stroma clavulé et *C. rouxii* Cand. groupe Valliformes mediae à stroma capité mais dont les spores sont supérieures: 16 $\times$ 2,5-3 μm et qui macroscopiquement est une espèce moins elancée et à stroma brun noir.

Nous remercions Gary Samuels pour ses suggestions.

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MYCOTAXON

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April-June 1979

CLATHRUS RUBER IN CALIFORNIA AND WORLDWIDE DISTRIBUTIONAL RECORDS

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Clathrus ruber Micheli ex Persoon (Clathraceae, Phallales, Gasteromycetes) has a red receptacle consisting of a spongy network with meshes unequal in size. The dark, foul-smelling gleba covers the inner surface of the receptacle and the basal portion of the receptacle is surrounded by a white volva with a central mycelial cord. The smooth, elongated spores measure 5-6 x 1.7-2 μ . Dennis (1954) stated that this species is distinguished from the closely related tropical species, Clathrus crispus Turpin, by the absence of corrugated rims which surround each mesh of the sporocarp. The species is well illustrated in the older literature as indicated by Saccardo and Traverso (1910).

American mycologists usually refer to this species as C. cancellatus Linnaeus, which is most likely based on the American Code of Botanical Nomenclature in which the starting point date was Linnaeus, Species plantarum, 1753. According to the International Code of Botanical Nomenclature the starting point date for the nomenclature of the Gasteromycetes is 31.XII.1801, the arbitrary publication date for Persoon, Synopsis methodica fungorum, 1801. Therefore, the correct specific epithet for this fungus is Clathrus ruber Micheli ex Persoon and the following are synonyms according to the literature:

Clathrus ruber Micheli ex Persoon, Synopsis
methodica fungorum, 2: 241, 1801.

= [Clathrus ruber Mich. Nova plantarum genera,
p. 214, tab. 93, 1729.]

- = Clathrus cancellatus L. ex Fr. a. ruber (Mich. ex Pers.) Fr. *Systema mycologicum*, 2: 288, 1823.
- = Clathrus nicaeensis Barla. *Les champignons de la province de Nice*, p. 108, pl. 45, fig. 5-12, 1859.
- = Clathrus cancellatus L. ex Fr. f. typicus Ed. Fisch. *Neue Denkschr. Allg. Schweiz. Ges. Gesamten Naturwiss.* 32: 58, 1890.

Persoon (1801) and Fries (1823, v. 2) provide additional pre-starting point synonyms.

The literature provides no mention of California as a distributional station for this species, but there have been four different California collections in the San Francisco Bay region. Sporocarps (NY) were found in Palo Alto, on soil in a slightly shaded garden on July 4, 1952 and again on July 6, 1952. Specimens (UC #143,727) were reported by Mrs. Ted Bowers of Oakland, in October 4, 1959, but no additional data on the collection are available. On several occasions in 1976 Harry Thiers (personal communication) reported finding the lattice stinkhorn in some of the flower beds or cultivated areas in the arboretum in Golden Gate Park, San Francisco. The specimen (Fig. 1) (SFU-HDT #36,481) examined was found under Escallonia sp. In the fall of 1977, James Armstrong (personal communication) found the fungus in sandy soil under Veronica sp. south of Golden Gate Park. No voucher specimen exists for this find, but a photo of it is deposited in (NY).

Clathrus ruber had been previously reported from five states in the United States. Schweinitz (1822) reported it from Georgia. In June 1966, Kozelnicky and Moncrief (1966) found the stinkhorn in Virginia and North Carolina in golf turf. Peck ("1879" [1880]) reported the species from Buffalo, New York. His distributional record is questionable and the species reported may be C. columnatus Bosc according to Lloyd (1903). Murrill (1951) indicated the presence of the fungus in Florida. Gillis (1972) reported that this phalloid was found in the Miami,

Fig. 1. Clathrus ruber. ca x 1.75.



Florida, area and was frequently spotted at the Kampong in Coconut Grove, Florida.

Lloyd (1909) stated that C. ruber is a native of southern Europe and had been found in Italy, southern France and rarely in the channel coast of France, England and into Holland. Northern Africa was also cited by Lloyd as a distributional station. He (1906) also included Switzerland and the islands of the Mediterranean as distributional stations. Dennis (1955) provided a complete record of distribution for England and a distributional map for western Europe. Coker and Couch (1928) listed Jamaica, the Bahamas and Puerto Rico as places from which specimens had been examined. Fischer (1888) cited additional locations of Santo Domingo, Sri Lanka (cited as Ceylon), Khasia, Greece, Hindustan (cited as Hindostan) and New Zealand. In Africa Bottomley (1948) mentioned the fungus from Lake Nyassa and Hendrickx (1948) cited collections from Lukolela and Ipamu, Zaire. The tropical distributions cited by Coker and Couch, Fischer, Bottomley and Hendrickx are dubious since C. ruber is not a tropical species. Eckblad (1975) cited the Canary Islands. Dennis (1977) cited the Azores and he (personal communication) indicated records from Luxemburg, Lithuania and a questionable one from Greece. This phalloid had also been cited for the following countries: Canada (Lowe 1977), Mexico (Guzmán 1972 & 1975), Ireland (Scannell 1974), Belgium (Dennis 1955), Portugal (Almeida 1972), Spain (Calonge 1975), West Germany (Koch 1975), East Germany (Thiel and Breikopf 1976), Czechoslovakia, Yugoslavia and Poland (Pilát 1958), Romania (Eliade 1965), U.S.S.R. (Sosin 1973), Iran (Ershad 1977) and Japan (Kobayasi 1938).

Porcher (1854) graphically provided the following account of a poisoning by this species: "A young person having eaten a bit of it, after six hours suffered from a painful tension of the lower stomach, and violent convulsions. He lost the use of speech, and fell into a state of stupor, which lasted for forty-eight hours. After taking an emetic he threw up a fragment of the mushroom, with two worms, and mucus, tinged with blood. Milk, oil, and emollient fomentations, were then employed with success."

I am grateful for the loan of specimens from the New York Botanical Garden's Cryptogamic Herbarium and the

University Herbarium of the University of California-Berkeley through the aegis of the Santa Barbara Botanic Garden. I thank Larry Stickney and James Armstrong for distributional data. Special gratitude is extended to Dr. Clark T. Rogerson for supplying information on older references; to Dr. Richard P. Korf and Dr. R.W.G. Dennis for reviewing and revising the paper; and to Dr. Harry D. Thiers for his suggestions in revising this paper, for distributional information and for the color photo.

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MYCOTAXON

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April-June 1979

PISOLITHUS TINCTORIUS, A PAVEMENT BREAKER IN SOUTHERN CALIFORNIA

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The distribution in the United States of Pisolithus tinctorius (Pers.) Coker & Couch (Gasteromycetes: Sclerodermatales) was cited by Marx (1977) as occurring in 38 states. In addition occurrence in the District of Columbia was cited by Grand (1976).

From September to December 1978, a large number of fruitings of P. tinctorius occurred throughout the University of California, Santa Barbara campus. Collections are deposited in LG, NY and UCSB herbaria. Pisolithus tinctorius occurred in silty sand alongside bike lanes, paths and sidewalks under Juniperus sp., Eucalyptus globulus Labill., Pinus pinea L. and P. radiata D. Don. The species of tree associates supplement Marx's (1977) list for the United States. McClatchie (1897) stated that Pisolithus tinctorius (cited as Polysaccum crassipes DC) was found only occasionally in soil under Eucalyptus trees in the Southern California coastal region.

An unusual occurrence was observed on October 10, 1978. Under Pinus radiata a large sporocarp had erupted through macadam 4 cm thick of a bike lane creating a hole 10.5 x 19 cm. Stevenson (1936) reported similar pavement breakage

for the gasteromycetous fungi, Phallus ravenelii Berk. & Curt. (cited as Ithyphallus ravenelii (Berk. & Curt.) Fisch.) and Scleroderma geaster Fr.

The authors extend gratitude to Dr. L. F. Grand for reviewing this paper.

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ACAULOSPORA BIRETICULATA SP. NOV.

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As part of a continuing study on the endomycorrhizal status of six high-value hardwood species, seedlings of these and various other hardwoods were extracted from seed-bed or perimeter areas of the two state tree nurseries in Kentucky. A portion of the soil collected with the seedlings from each of the growing sites was examined for spores of vesicular-arbuscular (VA) fungi by a wet sieving method (Gerdemann and Nicolson, 1963). In addition, young root segments were cut from each seedling and examined for VA mycorrhizae by the Phillips and Hayman (1970) staining procedure, with some modifications. The remaining soil and chopped root segments from each sample were thoroughly mixed and planted to corn (*Zea mays* L.) in greenhouse flats. After the seed germinated, the plants were supplied with Long Ashton nutrient solution each week for 5 weeks. After 90 days' growth, the corn roots were examined by the above-mentioned staining technique. A new species of *Acaulospora* was found in a perimeter soil sample from the Kentucky Dam tree nursery. Microscopic slides and photographs that illustrate the stages of development in the type species of this VA mycorrhizal fungus have been deposited in the herbarium at Oregon State University.

ACAULOSPORA BIRETICULATA Rothwell and Trappe sp. nov.
(Figs. 1-2)

Sporocarpia ignota. Azygosporae singulae in solo efformatae, sessiles, lateraliter gestae in hypha 10-30 μ m diam in vesiculo globoso prope terminata. Sporae globosae, 150-155 μ m diam, pallide brunae; reticulo cristis $2 \times 1.5-2 \mu$ m e stratis tribus formatis; alveolae reticulati 6-18 μ m longae, pagina sporae inclusae processibus angulatis, obtusis $1 \times 1 \mu$ m, munitae aspectu reticuli inversi. Sporae tunica e stratis tribus, unumquidque $\bar{+} 1 \mu$ m crassum. HOLOTYPEUS Rothwell SP169 (OSC).

Sporocarps unknown. Azygospores formed singly in soil, sessile, borne laterally on a hyaline, thin-walled hypha tapered from 2.5-7.5 μ m diam at its base to 10-30 μ m diam near its terminus, globose to subglobose vesicle 127-135 μ m diam; spore-bearing hypha with emergent, branched, flagellate hyphae and collapsing by maturity. Spores globose, 150-155 μ m diam, subhyaline in youth, becoming light brown by maturity. Spore surface ornamented with a polygonal reticulum, the ridges $2 \times 1.5-2 \mu$ m with sinuous, dark grayish-green sides and a paler, depressed central stratum; ridges occasionally branched toward the center of polygons or forming irregular, isolated projections at polygon centers. Polygons 6-18 μ m long, the enclosed spore surface beset with round-tipped, 4- to 6-sided processes $\bar{+} 1 \times 1 \mu$ m to give the appearance of an inverted reticulum. Spore walls of three layers, each $\bar{+} 1 \mu$ m thick, the outer layer dark grayish green to grayish brown, the inner layers hyaline.

DISTRIBUTION AND HABITAT: To date, *A. bireticulata* is known only from a perimeter soil sample of the Kentucky Dam tree nursery in western Kentucky.

MYCORRHIZAL ASSOCIATIONS: Associated in nature with the roots of *Sassafras albidum* (Nutt.) Ness, and in greenhouse culture with *Zea mays* L.

COLLECTIONS: TYPE: KENTUCKY, Marshall County, Kentucky Dam Nursery, October 1976, Rothwell SP169 (OSC).

The complex spore ornamentation of *A. bireticulata* distinguishes it from all other known members of the genus. *A. elegans* spores often have a single-layered reticulum deposited on top of crowded spines 0.5 μ m thick that

ornament the spore surface. The three-layered reticulum and angular processes 1 μ m thick on spores of *A. bireticulata* are distinctly different.

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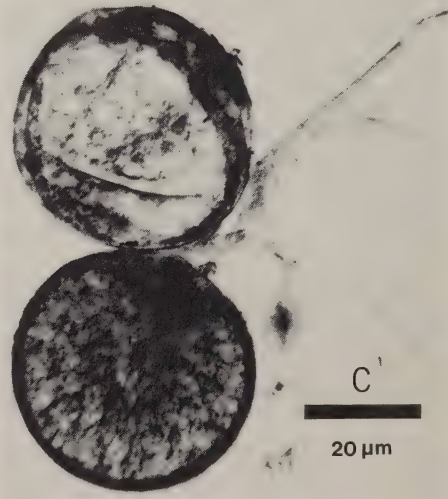
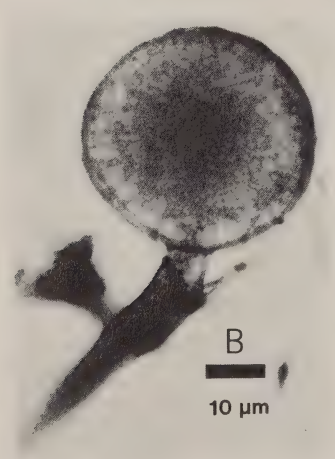
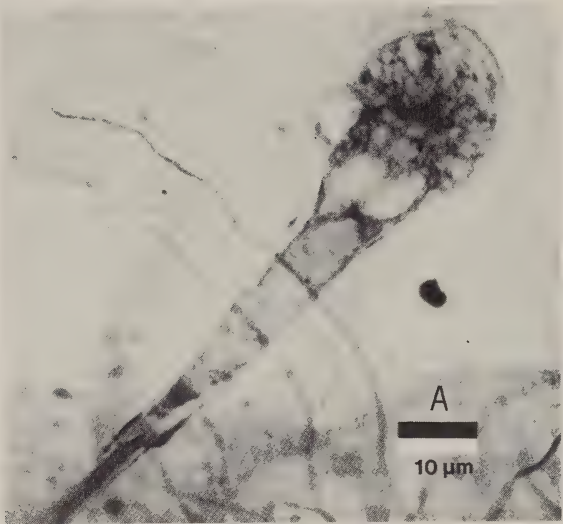
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PLATES

(on pages that follow)

FIG. 1, A-D. Developmental stages in the formation of azygospores in *Acaulospora birecticulata*. (A) Early stage of vesicle formation (scale bar, 10 μ m). (B) Mature vesicle with branched, flagellate hyphae (scale bar, 10 μ m). (C) Late stage in transfer of vesicle contents to azygospore (scale bar, 20 μ m). Note spore size, which approximates the emptying vesicle. (D) Mature azygospore attached to empty, collapsed vesicle (scale bar, 30 μ m).



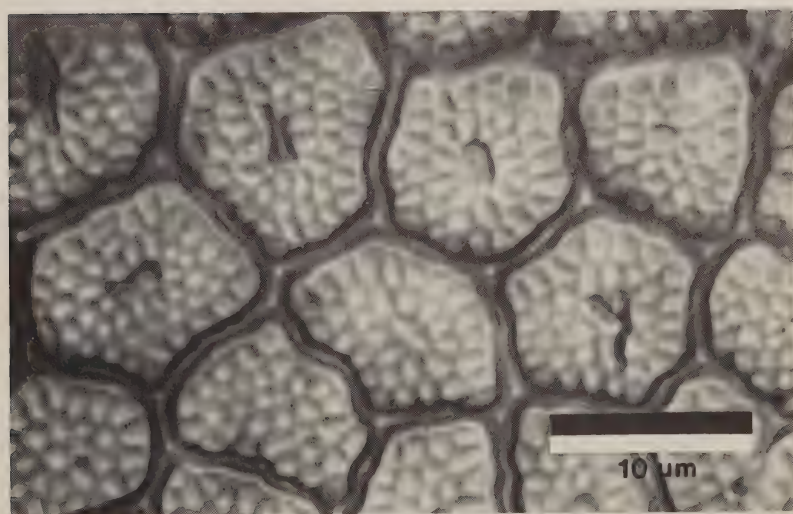
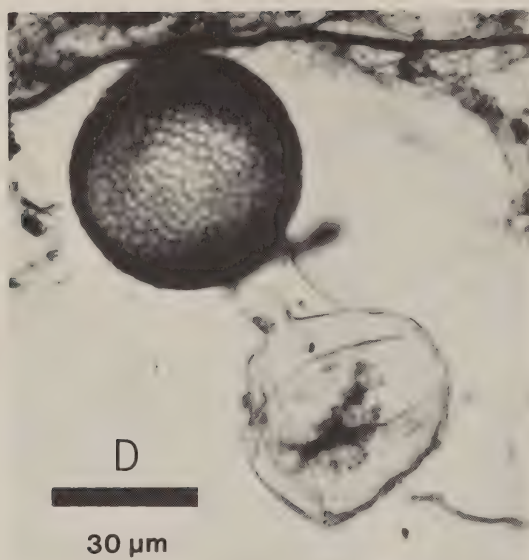


FIG. 2. Detail of double reticulum on outer wall of azygospores (scale bar, 10 µm).

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FIRST AUTHENTICATED NORTH AMERICAN RECORD OF MONILINIA FRUCTIGENA, WITH NOTES ON RELATED SPECIES

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SUMMARY

A fungus indistinguishable from *Monilinia fructigena* was isolated during an evaluation of accessions of pears for the occurrence of fungi causing brown rots of fruits at Beltsville, Maryland. It has narrow-ellipsoid ascospores with tapered, but not pointed, ends; its conidia are elongate-ellipsoidal and the conidiophores are generally arranged in buff to light yellow-brown sporodochia. In contrast, the ascospores of *M. fructicola* are ellipsoidal or ovoid and generally have rounded ends; the conidia are limoniform or ellipsoidal; and the sporodochia are light grayish to mouse gray. *M. laxa* does not morphologically differ appreciably from *M. fructicola*, except for slower, scanty, and effuse growth on potato dextrose or peach agar media, and lobate intramatrical margin.^{1/}

INTRODUCTION

Monilinia Honey (Discomycetidae: Inoperculatae) includes approximately 30 species and primarily attacks Rosaceae and Ericaceae (4,7,8). Three species, *M. fructicola* (Wint.) Honey, *M. fructigena* (Aderh. & Ruhl.)

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^{1/}Mention of a trademark or proprietary product does not constitute a guarantee or warranty of the product by the U. S. Department of Agriculture and does not imply its approval to the exclusion of other products that may also be suitable.

Honey, and *M. laxa* (Aderh. & Ruhl.) Honey, are destructive to apples, pears, and stone fruits. They cause brown rots of fruits, blossom wilt and blight, and stem cankers which often follow blossom blight or fruit rots (2,7,13). Apothecia of *Monilinia* arise from a hollow-sphaeroid stroma. Monilioid chains of conidia are produced on all affected parts of the host and the conidiophores in many species, including the ones causing the brown rots of fruits, are usually arranged in sporodochia.

OBSERVATIONS

Since 1973, field-collected mummies of stone fruits, apples and pears have been routinely incubated on a window sill at this laboratory to obtain apothecia of *Monilinia*. During April, 1974, two long-stalked, 1-3 mm wide apothecia developed in one of the five dishes containing 'Kieffer' pears (*Pyrus serotina* Rehder var. *culta* Rehder X *P. communis* L. var. *sativa* L.) collected at the "South Farm", USDA, Beltsville, MD. One of the apothecia aborted, but the other matured. Several single-ascospore cultures were obtained using a technique described earlier (1). At the time of initial plating the isolates did not sporulate on Difco potato dextrose agar or peach agar, but two of the seven single-spore isolates formed stroma characteristic of the family Sclerotiniaceae, which includes *Monilinia*. Although the cultures were buff to light yellow-brown (instead of the usual light gray to mouse gray) they were accessioned and stored at 5C for 16 months along with over 160 isolates of the North American brown rot fungi *M. fructicola* and *M. laxa*. All seven isolates subsequently formed conidia and microconidia on Difco malt agar.

During the fall of 1975, P. D. Millner of this Laboratory recovered several isolates of a *Monilinia* from conidia-bearing whitish sporodochia on fruits of the same 'Kieffer' pear tree from which the apothecia-bearing mummies originated in the spring of 1974. These isolates resembled the cultures of ascosporic origin described above but sporulated on potato dextrose agar and peach agar. The conidia of these fall isolates were characteristic of *M. fructigena*. Additional 'Kieffer' pears infected with this organism could be detected in the field on the basis of whitish to buff sporodochia during October, 1975. *M. fructicola* also attacked various pear cultivars in the orchard at this time and could be readily recognized because of its grayish sporodochia. Six 'Kieffer' trees

were tagged for presumed cankers and for detection of *M. fructigena* during the following spring. However, the pathogen was not recovered from any of the 25 presumed cankers or from blossoms.

All Beltsville isolates designated as *M. fructigena*, including those from apothecia, were compared with 38 single conidial representative isolates of *M. fructicola* and with 13 similar isolates of *M. laxa*. Isolates of the latter two species came from diverse Rosaceae from the United States and represented all available morphological variants. Also, fruits of 'Bartlett' (*Pyrus communis*) and 'Kieffer' pears and 'Golden Delicious' apples (*Malus sylvestris* Mill.) were aseptically inoculated in the laboratory with the Beltsville isolates. Symptoms and signs were noted, and the fungus was reisolated and compared with authentic herbarium material and with a European isolate of *M. fructigena*, ATCC 24976, cultured at the American Type Culture Collection, Rockville, Maryland. Dried cultures, mummies, microscope slides and numerous photographs are on deposit at the National Fungus Collections of our laboratory and living cultures are deposited with the ATCC. The following description and comparative account of *M. fructigena*, is based entirely on the Beltsville material and compares well with that given by Harrison and others outside North America (2,5,6,9,10,11,13). The characterization of *M. fructicola* is closely comparable with descriptions by Elliot (3) and by Honey (7). The American account of *M. laxa* does not differ from European accounts (2,13) although I have not compared cultures from the two areas.

Salient Characters of Beltsville Specimens

Monilinia fructigena (Aderh. & Ruhl.) Honey (Figs. 1,2,4)

Apothecia cupulate, stipitate, light brown, margin entire, the mature apothecium 3 mm in diam., anatomically similar to that of *M. fructicola* as recently described by Elliot (3); asci cylindrical, 8-spored, pore staining blue with Melzer's reagent, 160-180 X 9-11 μ m; ascospores uniseriate, arranged obliquely or end to end within the ascus, hyaline, eguttate, smooth, narrow-ellipsoidal, generally with ends tapered but not pointed, and measure 9-11 X 5.0-6.6 μ m (mode 10.0 X 5.5 μ m); paraphyses unbranched, septate, 2-3 μ m wide, not enlarged above; sporodochia on fruits solitary or confluent and matted on maturity, buff to light yellow-brown, 1-2 mm wide and up to 2 mm high; conidia elongate-ellipsoidal, 15-25 X 12-16 μ m (mode 21 X 14 μ m); seven day old colonies in an incubator at 25C and

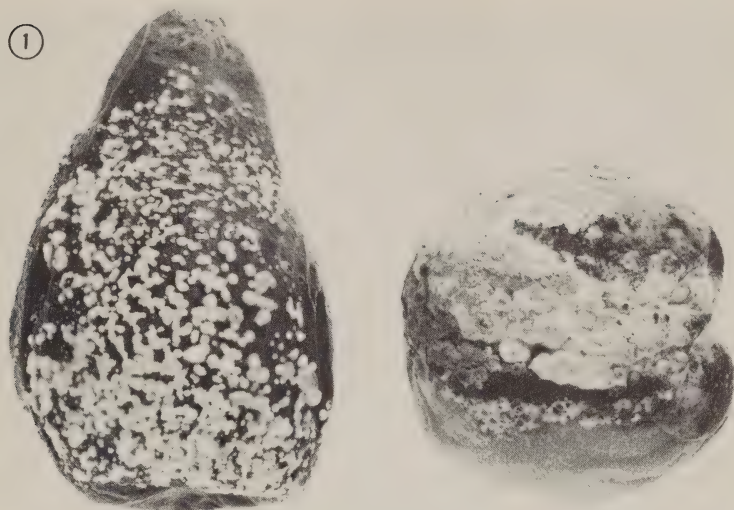


Fig. 1. Sporodochia of *Monilinia fructigena*. A 'Kieffer' pear and a 'Redskin' peach inoculated with Beltsville isolate Batra-3008, photographed 12 da. after incubation at 25C, approx. nat. size.

with 12 hour light-darkness cycle are 8.5 cm across, within 8th - 11th day a circular cushion-like band of fluffy mycelium, 5-6 mm wide, 3-4 mm high, and about 5 cm from the colony center, is formed, underneath which appear loaf shaped, nearly superficial, initially discrete but eventually confluent sclerotia between 12th and 21st day. Two to four similar additional concentric circles are subsequently formed outside the first circle and monilioid chains of conidia are abundant throughout the colony. Apples, pears and peaches inoculated with *M. fructigena* remain rather compact, and the mycelium, ectostroma, and sporodochial masses are conspicuous, tough and matted.

The preceding account of apothecia of *M. fructigena* resembles that of the type, as given by Harrison (6). The vegetative and asexual stages compare well with the following material from Europe: ATCC 24976; exsiccatae on deposit at the National Fungus Collections: C. Roumeguère fungi selecti exsiccati 6566 and de Thümen, Mycotheca Universalis 477 and 1377.

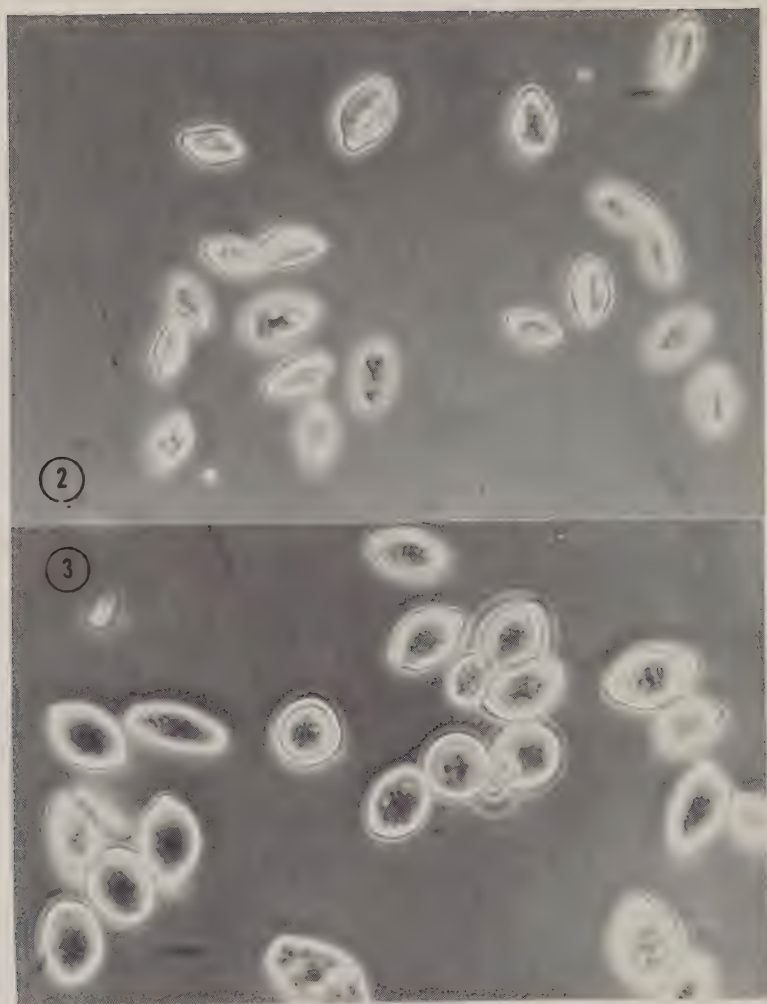


Fig. 2,3. Conidia mounted in water. 2. *M. fructigena*;
3. *M. fructicola* All X650.

Monilinia fructicola (Wint.) Honey

(Figs. 3,5)

Elliot (3) gives an updated account of *M. fructicola* and my observations on 12 microscope slides, prepared by E. K. Cash in 1924, from the apothecial material of the type confirm this account. Apothecia of this species are uncommon at Beltsville but apparently common elsewhere in



Figs. 4,5. Ascospores mounted in lactophenol. 4. *M. fructigena*; 5. *M. fructicola*. Both X1500.

North America (2,5,6,7). The ascospores are ellipsoidal to ovoid, generally with rounded ends, hyaline, binucleate, and measure $10.5\text{--}13.0 \times 4.5\text{--}6.6\text{ }\mu\text{m}$. The sporodochia on fruits are granular, usually discrete, light gray or mouse gray, $0.5\text{--}0.75\text{ mm}$ wide and up to 1 mm high. The conidia are limoniform or ellipsoidal and measure $15\text{--}17 \times 8\text{--}11\text{ }\mu\text{m}$. The colonies grown under similar conditions as those for *M. fructigena* are grayish to olive gray, and the sclerotial masses, though concentric, are ill-defined, thin, and mostly intramatrical. Apples and pears inoculated with *M. fructicola* are spongy or soft and sporodochia on the fruit surface are inconspicuous or lacking.

Monilinia laxa (Aderh. & Ruhl.) Honey

This is a well recognized European species and its biology and cultural characteristics are subtly but consistently different from those of *M. fructigena* (2,11,13) and *M. fructicola*. I did not examine any living material of it from overseas. The North American west coast *Monilinia* causing blossom blight and fruit rot of stone fruits has been referred to as this species but without critical, comparative investigations, probably because of quarantine considerations. The western United States isolates of *M. laxa* were compared with the eastern isolates of *M. fructi-*

gena and *M. fruticola*. Except for its slower, scanty, and effuse growth, and lobed intramatrical margin, *M. laxa* does not morphologically differ appreciably from *M. fruticola*. Apothecia of *M. laxa* were initially reported from Germany and twice from England (6,12). The ascospores have two or three oil drops and rounded ends. The light gray sporodochia are 0.5-.75 mm wide and 0.5 mm high and the conidia are ellipsoidal, 12-18 X 9-10 μ m. According to Wormald's (13) description of cultures of *M. laxa*, the western United States brown rot of *Monilinia* may well be congeneric with the European species.

CONCLUSIONS AND DISCUSSION

I investigated herbarium material or cultures of many populations of 23 species (over 700 herbarium specimens and 160 cultures) of the approximately 30 species recognized for *Monilinia* and have critically studied the descriptions of the rest. In general, the external apothecial characters and asci, ascospores and paraphyses have limited value in delineating a species. In seven species of *Monilinia* from Japan, Harada (4) found asci and ascospores rather similar in appearance but most species could be separated from each other on the basis of shape and size of conidia and general colony characters. Taken as a whole, one or two micromorphological, subtle but consistent cultural characters, and symptoms and signs of the diseased material, as indicated above, are available to delineate *M. fructigena*, *M. fruticola* and *M. laxa*. The latter two species are distinct from each other, as judged from electrophoresis (11).

M. fructigena is predominantly restricted to Europe, Western USSR, Turkey, Iran, Israel, Korea, Japan and Morocco. These reports are backed by adequate data on fungus morphology, symptomatology, or both. Since *M. fruticola* is unknown from Eurasia, the presumed primary gene center of *M. fructigena*, it would be important to know what factors have kept apart the two species, particularly since (1) both species have a wide host range in their native areas (13), (2) there has been considerable reciprocal traffic of fruits and nursery stock, and (3) the fungi do overwinter in cankers of Rosaceae (although *M. fruticola* does not survive for long in cankers). Such information would be useful to adequately assess the potential or actual threat of each species after their entry and establishment outside their present geographic range.

At Beltsville in my studies in a related program on

brown rot fungi, *M. fructigena* was not recovered from stone fruits although several hundred isolations were attempted from blossoms, twigs, and fruits during 1973 through 1978 and several thousand fruits were examined in the field. It only came from one mummied 'Kieffer' pear during the spring of 1974 and from several fruits of the same cultivar found on the ground during October, 1975. *M. fructicola*, on the other hand, was the commonest fungus observed during surveys of orchards of stone fruits, including apricots (*Prunus armeniaca* L.), plums (*P. domestica* L. and allied species), peaches and nectarines (*Prunus persica* (L.) Batsch and its var. *nectariana*) at Beltsville. It also occasionally attacked diverse apples and pears.

Since I have been unable to recover apothecia or cultures of *M. fructigena* from additional mummies of 'Kieffer' pears collected from the initial site or to isolate the fungus from marked "cankers", the primary source of inoculum cannot be pin-pointed. Additional critical surveys must be conducted to confirm my findings and before implementing any control measures, including containment by quarantine.

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A PRELIMINARY ACCOUNT OF THE TAXA DESCRIBED IN CALONECTRIA

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SUMMARY

Taxa described in *Calonectria* are reevaluated based on a study of type specimens. If unrelated to *Calonectria*, nectrioid species with multiseptate ascospores are returned or transferred to *Nectria*, placed near related, uniseptate species. Fourteen names are transferred to *Nectria*: *N. albosuccinea*, *N. calami*, *N. coccidophaga*, *N. collapsa*, *N. cyathula*, *N. erythrina*, *N. geraldensis*, *N. gymnosporangii*, *N. lagerheimiana*, *N. miniscula*, *N. novae-zealandica*, *N. pseudopeziza*, *N. varians* and *N. vernoniae*. Five new names are proposed for species whose epithets are preoccupied in *Nectria*: *N. astromata*, *N. byssophila*, *N. jactata*, *N. megaspora* and *N. microleuca*. Additional new combinations of species in the Hypocreales are *Allonectella guaranitica*, *Nectriella sceptri* and *N. obvoluta*. Two names are transferred to ostropalean genera: *Absconditella duplicella* and *Cryptodiscus rutilus*. In the Dothideales the new combination *Hyalocrea arcuata* is proposed. Three names are transferred to *Tubeufia*, *T. aurantiella*, *T. pachythrinx* and *T. stromaticola* and one to *Massarina*, *M. viburnicola*. Among the pleosporaceous fungi occurring on *Meliola* six new combinations are proposed: *Byssocallis capensis*, *Melioliphila appendiculata*, *M. coralloides*, *M. erysiphoides*, *M. longisetosa* and *M. volutella*.

The genus *Calonectria* de Notaris has been redescribed by Rossman (1979) based on the monotype species, *C. daldiniana*, a later synonym of *C. pyrochroa*. *Calonectria* now includes only those species having an ascocarp wall structure similar to *C. pyrochroa* and a *Cylindrocladium* anamorph. In the past *Calonectria* has included all species which are like *Nectria* but have multiseptate ascospores (Saccardo, 1883; Seaver, 1909a; Rogerson, 1970). With an increased knowledge of the correlation of ascocarp wall structure with anamorph, several workers (Booth, 1959, 1978; Samuels, 1976a, 1978; Samuels & Rossman, 1979) have defined groups of related species within the *Nectria*-complex. These include species from genera related to *Nectria* but previously separation on the basis of ascospore septation. Thus, segregation of genera based on ascospore characters has been shown to be artificial. In this paper the taxa described in *Calonectria* are reevaluated. Nectrioid

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species, which are unlike *Calonectria sensu stricto* but have multiseptate ascospores, are returned or transferred to *Nectria*, placed near related species having uniseptate spores.

Each specific epithet is listed alphabetically in *Calonectria*, followed by nomenclatural and taxonomic synonyms. Intraspecific epithets follow the specific epithet in *Calonectria* under which they were proposed. The names which I accept are capitalized. All references to herbaria are abbreviated using Holmgren & Keuken (1974). Specimens at FH are housed in special collections for which the following abbreviations are used: FH-C, Curtis herbarium; FH-ex, undistributed exsiccati; FH-G, general herbarium; FH-H, von Hohnel herbarium; FH-P, Patouillard herbarium. Special collections cited from CUP are CUP-A, Atkinson herbarium and CUP-F, Fairman herbarium. Except for placing the anglicized version of the country first, the unedited citation of the type specimen is reproduced here as printed in the original description, including punctuation and italicized words. Reference to a name which has been placed in *Calonectria* is noted in the synonymy and should be cross-checked under that epithet for further information. Unless type or authentic specimens were located and adequate for microscopic examination, I have not speculated on the identity of a taxon. Most older descriptions and illustrations are inadequate to determine ascus type, a character now considered of primary importance.

Calonectria aculeata (Kirschst.) Weese, Centralbl. Bakteriöl., 2 Abth. 42:595. 1914.

= *Trichonectria aculeata* Kirschst., Verh. Bot. Vereins Prov. Brandenburg 47:60. 1907.

Type: Germany. Auf der Rinde einer abgestorbenen noch stehenden Rottanne in der Rathenower Stadtforst. 22. 11. 05.

The holotype specimen (B) has nothing on it resembling the described fungus. From the description this species may be a later name for *Nectria hirta* (= *Calonectria hirta*, = *Trichonectria hirta*) but without a good authentic specimen this synonymy cannot be adequately determined. *Trichonectria aculeata* is the monotype species of *Trichonectria* Kirschst.

Calonectria adianti Rehm, Hedwigia 37:197. 1898.

= *Melioliphila adianti* (Rehm) Piroz., Kew Bull. 31:596. 1976.

Type: Brazil. Auf Adiantum trapeziforme. Tubarão. Ule no. 1326 a. H. B.

An isotype specimen at FH-G with the additional data "Estado de Sta. Catharina: Mai 1890" lacks any fungus resembling the description. In FH-H another isotype "ex Herb. Berlin" again has no suitable fungus. At S there are notes made by Rehm of the type "ex Herb. Berol." but no specimen. The holotype specimen at B has apparently been destroyed. The type description, Rehm's notes and a description by Batista, et al. suggest that this species may be *Melioliphila balanseana* (= *Calonectria balanseana*) as are many later spec-

imens labelled *C. adianti*. Without examining the type specimen, Pirozynski (1976) transferred the species to *Melioliphila*.

Calonectria agnina (Rob. ex Desm.) Sacc., *Michelia* 1:311. 1878.

= *Sphaeria agnina* Rob. ex Desm., *Ann. Sci. Nat. Bot.*, ser. 3, 6:72. 1846.

= *NECTRIA DECORA* (Wallr.) Fuckel, *Jahrb. Nassauischen Vereins Naturk.* 23-24:179. 1870.

Type: France. Ad ramos siccos Ulmi, autumnno. Nob.

In discussing this species, Desmazières (1846) stated "Les branches et surtout les rameaux secs de l'Orme, exposés à une humidité prolongée, donnent naissance à cette Sphérie, l'une des plus jolies et des plus petites que nous connaissons." The label of Desmazières, Pl. Crypt. France #1765, issued in 1849 as *Sphaeria agnina*, reads "En automne, sur les branches et surtout sur les rameaux secs de l'Orme, exposés à une humidité prolongée." Although not specifically designated, Desmazières's comments in the original description and on the packets indicate that this exsiccati number is the type collection. Many isotype specimens of Desmazières, Pl. Crypt. France #1765 have been examined (BPI, BR, FH-H, H, NY, UPS). The specimen at NY is here designated the LECTOTYPE. As Weese (1914a), Wollenweber & Reinking (1935) and Pirozynski (1975) have suggested, this name is found to be a later synonym of *Nectria decora* (= *Calonectria decora*).

Calonectria albosuccinea Pat., *Bull. Soc. Mycol. France* 8:132. 1892.

= *NECTRIA ALBOSUCCINEA* (Pat.) Rossman, *comb. nov.*

= *Calonectria ecuadorica* Petrak, *Sydowia* 4:463. 1950.

Type: Ecuador. Sur écorce purrie. Puente de Chimbo. Aout.

The holotype specimen (FH-P) is in good condition. This species is hypocreaceous but is unrelated to *Calonectria* as recently circumscribed by Rossman (1979). The ascocarp wall of *Nectria albosuccinea* is white and rough-warted, similar to that of *Nectria rigidiuscula* (= *Calonectria rigidiuscula*); however, *N. albosuccinea* lacks a well-developed stroma. *N. albosuccinea* is also reminiscent of *N. astromata* (= *C. verrucosa*), the latter having longer ascospores. The specimen described by Petrak (1948) as *C. albosuccinea* was examined (BPI). It has dark-red ascocarps on a well-developed stroma, not at all like Patouillard's type specimen. This mistaken concept of the species is perpetuated in Dennis (1970).

Calonectria ambigua Speg., *Anales Soc. Ci. Argent.* 12:212. 1881.

= *Subiculicola ambigua* (Speg.) Speg. (*ut* 'Speg.'), *Bol. Acad. Nac. Ci.* 26:347. 1924.

= *MELIOLIPHILA VOLUTELLA* (Berk. & Br.) Rossm., *Mycotaxon* 8:551. 1979.

Type: Brazil. In foliis vivis Laurineae cujusdam in nemorosis prope Apiahy, Jul. 1881, leg. Cl. Dr. J. Puiggari, sub. n. 1507. (no. 1661).

The holotype (LPS) is a good specimen of *Melioliphila volutella* ($\equiv$ *Calonectria volutella*) having bitunicate asci and white, setose ascocarps which occur on *Meliola*. The isotype (FH-P) is different from the holotype specimen. The isotype is *Melioliphila balanseana*, closely related to *M. volutella*, but lacking hairs on the ascocarp. Spegazzini (1881) described hairs on the ascocarp, stating that they often disappear with age. Balansa, Pl. du Paraguay #3796 (NY) issued as *C. ambigua* is *Melioliphila balanseana* ($\equiv$ *C. balanseana*). *C. ambigua* is the monotype species of *Subiculicola* Speg., a synonym of *Melioliphila* Speg., whose monotype species is *C. graminicola* Stevens, a synonym of *M. volutella* ($\equiv$ *C. volutella*). These genera were published on the same day. Pirozynski (1976) stated that *Subiculicola* is questionably synonymous with *Melioliphila*. In accordance with Article 57 of the International Botanical Code (Stafleu, et al., 1972) and Pirozynski's apparent preference, *Melioliphila* is chosen as the correct name.

Calonectria ambigua var. *exappendiculata* Speg., Anales Soc. Ci. Argent. 33:476. 1919.

Type: Brazil. Sobre las hojas vivas de una Sapindaceae?, cerca de Apiahy, enera 1888 (J. Puiggari, no. 1507).

The label of the specimen sent from LPS as the holotype of this variety reads "TIPO. No. 1660. S/ .Sapindaceae Brasil, Apaihy, I-188. Leg. J. Puiggari, nro. 1507." Although the collection data given in the type publication are slightly different from those on the packet, the Puiggari number is the same. In addition, these collection data and Puiggari number are almost the same as that of the typical variety. Years after he described *Calonectria ambigua* ($=$ *Melioliphila volutella*), Spegazzini may have noticed the ascocarps of this variety on the holotype specimen of *C. ambigua* and split the collection. The hyperparasitic species on *Meliola* often occur intermixed on the same colony. The specimen has no ascocarps. The drawings on the packet and published description of *C. ambigua* var. *exappendiculata* suggest *Melioliphila balanseana* ($\equiv$ *Calonectria balanseana*).

Calonectria apoensis Petrak, Sydowia 22:392. 1969.

Type: Philippines. Mt. Apo, Davao Prov., Mindanao, auf stark, verfaulten Blattscheiden von *Musa textilis*, June, 1924, leg. M. S. Clemens, nr. 5268.

The holotype specimen may beat W but Petrak's specimens are not yet available for study.

Calonectria appendiculata Rehm, Hedwigia 37:197. 1898.
 $\equiv$ *MELIOLIPHILA APPENDICULATA* (Rehm) Rossman, comb. nov.

Type: Brazil. Folia Euphorbiaceae. Ule no. 927. H. B.

The holotype specimen at B has apparently been destroyed; therefore, the isotype specimen in FH-H "ex Herb. Berlin" is here designated the LECTOTYPE. The lectotype reveals a *Melioliphila* species, close to *M. balanseana* ($\equiv$ *Calonectria*

balanseana) and *M. volutella* ($\equiv$ *C. volutella*) but the ascomcarps have short, blunt hairs around the ostiole and hyphae radiating from the sides and base of the ascomcarp. Later collections, issued as *C. appendiculata*, Rehm, Ascomyceten #1689 (BPI, CUP) and Theissen, Decades Fungorum Brasiliensum #149, are *Melioliphila balanseana*.

Calonectria arcuata Hansf., Mycol. Pap. 15:119. 1946.

$\equiv$ *HYALOCREA ARCUATA* (Hansf.) Rossman, *comb. nov.*

Type: Uganda. Entebbe Road, in plagulis Asterinae in foliis Tetraceraceae potatoriae, Hansford no. 2797.

The holotype specimen at IMI has been examined as well as several paratype and authentic specimens (BPI: Hansford 2796 & 3353; PREM: Hansford 3490). This species is dothideaceous, having bitunicate, saccate asci with few asci per ascomcarp, and belongs in *Hyalocrea*, whose monotype species, *H. epimyces* ($\equiv$ *Calonectria epimyces*), has light-yellow ascomcarps and occurs on the carbonous stromata of other fungi.

Calonectria atkinsonii Rehm, Ann. Mycol. 2:178. 1904.

= *HERPOTRICHIA MUTABILIS* (Pers. ex Fries) Winter, Rabenh. Kryptogamen-Fl. Bd. 1 Abt. 2:209. 1887.

Type: United States. MacKinney Glon, leg. Ritters. Comm. Atkinson no. 5240 (sub *Calonectria chlorinella* Cooke ?), ad corticem.

The data on the type collection are somewhat altered in the original publication and, as stated on the isotype packet (CUP-A), should read "New York, Cayuga Lake Basin, McKinney's Glen, leg. A. J. Pieters, Oct. 27, 1894, #5240." The holotype (S-as *Calonectria chlorinella*), isotype specimen (CUP-A) and isotype slides (FH-G, IMI) were examined. In agreement with C. T. Rogerson, New York Botanical Garden, this name is found to be a later synonym of *Herpotrichia mutabilis*, as are numerous specimens deposited as *C. atkinsonii*.

Calonectria aurantiella Penz. & Sacc., Malpighia 11:515. 1897.

$\equiv$ *TUBEUFIA AURANTIELLA* (Penz. & Sacc.) Rossman, *comb. nov.*

Type: Java. Tjibodas, ad ligna putrida superficiei obscurata, 1.III.97. No. 126.

Although the fragmentary isotype at FH-H has nothing on it, the holotype specimen (PAD) reveals that this species belongs in *Tubeufia*, close to *T. palmarum* (Torrend) Samuels, Rossman & E. Muller, 1979. Occurring with dematiaceous fungi on well-rotted wood, *T. aurantiella* has fleshy ascomcarps covered with bright-yellow, crystalline granules, numerous pseudoparaphyses, bitunicate asci and long, fusiform ascospores.

Calonectria aurea (Crouan & Crouan) Sacc., Michelia 1:344. 1878.

$\equiv$ *NECTRIA AUREA* Crouan & Crouan, Florule de Finistère p. 37. 1867.

Type: France. Finistère, sur les tiges mortes de Ronce. Hiv. r. r.

The holotype specimen at CO was examined. Although the ascospores are multiguttulate, they have only one septum. The species is unrelated to *Calonectria*, as redefined by Rossman (1979), and is retained in *Nectria*, close to members of the *N. episphaeria*-group as delimited by Booth (1959).

Calonectria aurea Ade, Hedwigia 64:304. 1923, non *C. aurea* (Crouan & Crouan) Sacc., 1878.

Type: Germany. Auf der Innenseite abgeworfener, alter Buchenrinde in Gesellschaft einer Melanomma am Nordhang des Ruckberges bei Reussendorf (Rhön) auf Basaltboden bei ungefahr 850 m Höhe. 25.5.1915.

The holotype specimen could not be located. The occurrence with carbonous pyrenomycetes, color and hairs of the ascocarp, ascospore size, shape and septation, and associated *Helicomyces*, all suggest that this is *Tubeufia cerea* ($\equiv$ *Calonectria cerea*). Until an authentic specimen is located, this species cannot be accurately characterized.

Calonectria aurigera (Berk. & Rav.) Sacc., Michelia 1:308. 1878.

$\equiv$ *NECTRIA AURIGERA* Berk. & Rav. (ut '*auriger*'), Grevillea 4:46. 1875.

Type: United States. South Carolina, Santa Canal, on *Fraxinus*. Car. Inf. Ravenel no. 1830.

The isotype specimen (FH-C) and isotype slide (IMI) reveal this to be a good hypocreaceous species belonging to the *Nectria aquifolii*-group as delimited by Booth (1959). *N. aurigera* provides the earliest epithet for the North American species often mistakenly called *Scoleconectria polythalamia* sensu Ravenel, Fungi Carol. #541 and sensu Seaver (1909a). The holotype specimen of *Nectria polythalamia* ($\equiv$ *Calonectria polythalamia*, $\equiv$ *Scoleconectria polythalamia*) at K proves *N. polythalamia* to be a later synonym of *Thyronectria pseudotrichia* (Schw.) Seeler as suggested by Dingley (1952). Ellis, North Amer. Fungi #79 (CUP, FH-ex, NY) is correctly named as *N. aurigera*.

Calonectria bahiensis Hempel, Bol. Agric. (Sao Paulo) 5:22. 1904.

$\equiv$ *Anthostomella bahiensis* (Hempel) Speg., Revista Fac. Agron. Univ. Nac. La Plata ser. 2, 2:304. 1907.

Type: Brazil. No Estado da Bahia, vivendo como parasita na casca do tronco do Cacoeiro.

The holotype specimen (LPS) shows this species to be lichenized or perhaps, xylariaceous, as suggested by Spegazzini's combination. The name is not mentioned in Francis (1975). The semiimmersed ascocarps are carbonous, containing loose ascospores which are large, 60-70 x 20-23 μ m, nonseptate and dark-brown with germ pores at each end. The disposition of this species could not be determined.

Calonectria balanseana Berl. & Roum., Rev. Mycol. (Paris) 10:77. 1888.

= *MELIOLIPHILA BALANSEANA* (Berl. & Roum.) Piroz., Kew Bull. 31:596. 1976.

= *Calonectria melioides* f. *microspora* Rehm, Hedwigia 37:196. 1898.

= *Calonectria gyalectoidea* Rehm, Hedwigia 37:197. 1898.

= *Calonectria warburgiana* P. Henn. in O. Warburg, Monsunia 1:25. 1899.

= *Calonectria meliolae* Hansf., Proc. Linn. Soc. Lond. 153: 33. 1941.

Type: Philippines. Tonkino, in pagina superiore foliarum Bambusae speciei cujusdam.

Although not specifically stated, Roumeguère, Fungi selecti exs. #4452 collected in December 1887, has the above collection data and is assumed to be the type. Many specimens of this number have been examined (BPI, BR, FH-P, FH-ex, NY). The one at NY is here designated the LECTOTYPE; the others become isolectotypes. This species has fleshy, white ascocarps without hairs, bitunicate asci and occurs on *Meliola*.

[*Calonectria balanseana* Teng, Sinensia 4:276. 1934. nom. nud.]

Specimen cited: China. Kiangsu, Nanking, Teng 1285.

In an article on the Fungi of Nanking, Teng (1932) listed the specimen cited above as "*Calonectria balanseana* Berl., in Roum." Teng (1934) included this specimen from his earlier publication as a synonym of *Calonectria bambusae* (Hara) Höhnelt referring to "*Calonectria balanseana* Teng, Contr. Biol. Lab. Sci. Soc. China, Bot. 8:9. 1932. [non Berl.]" . In so doing Teng created a later homonym which is also a *nomen nudum*. This invalid name is listed by Tai (1937).

Calonectria balansiae A. Möller, Phycomyc. & Ascomyc., Untersuchungen aus Brasil p. 197. 1901.

= *Weesia balansiae* (A. Möller) Höhnelt, Akad. Wiss. Wien Sitzungsber., Math.-Naturwiss. Kl., Abt. 1, 129:150. 1920.

Type: Brazil. St. Catherine bei Blumenau auf grasbewohnender *Balansia redundans* A. Möller.

This is the monotype species of *Weesia* Höhnelt. The type specimen is not at B or FH-H and has not been located.

Calonectria balsamea (Cooke & Peck) Sacc., Syll. Fung. 9:986. 1891.

= *Nectria balsamea* Cooke & Peck, Grevillea 12:81. 1884.

= *THYRONECTRIA BALSAMEA* (Cooke & Peck) Seeler, J. Arnold Arbor. 21:442. 1940.

Type: United States. New York, North Elba, on dead branches of *Abies balsamea*, Aug. 1872, coll. C. H. Peck.

Isotype specimens (NY, NYS) were examined. This species has muriform ascospores and is, thus, justifiably placed in *Thyronectria*; however, it closely resembles *Scolecconectria cucurbitula* (= *Calonectria cucurbitula*), separated by the slightly shorter, wider ascospores with irregular, longitudinal septa. Both species belong in the *Nectria aquifolii*-group as delimited by Booth (1959). For a complete list of synonyms, consult Rossman (1977) and Seeler (1940).

Calonectria bambusae (Hara) Höhnelt, Ann. Mycol. 17:120. 1920.
= *MIYAKEAMYCES BAMBUSAE* Hara, Bot. Mag. (Tokyo) 27:248. 1913.

Type (translated from Japanese): Japan. Mino and Sagami, on stromata of *Phyllachora phyllostachydis* on bamboo.

Although not stated in the type description, Sydow, Fungi exotici exs. #385 issued in March, 1915 and labelled "nov. gen. et spec." is taken to be the type collection. These were the only specimens of this species encountered and the collection data in the type description match those on the exsiccati packets: "Japan: Kawauye-mura, prov. Mino. Parasitica in *Phyllachora Phyllostachydis* Hara ad folia *Phyllostachydis bambusoidis*. 11. 11. 1911. K. Hara." Specimens of this exsiccati number have been examined from B, BPI, C, CUP, DAOM, FH-G, FH-H, NY and S. The one at NY is here designated the LECTOTYPE; the others become isolectotypes. An authentic collection (FH-H, S) was made in January, 1912. This species appears hypocreaceous having brown, fleshy ascocarps and unitunicate asci but is quite unlike any other member of the *Nectria*-complex. The small, pyriform ascocarps are crowded together, partially immersed in a byssoid stroma of brown hyphae. At present, *M. bambusae*, the monotype species of *Miyakeamyces*, is retained in that genus, related to *Nectria*.

Calonectria bambusina Rolland, Bull. Soc. Mycol. France 17: 119. 1901.

Type: France. Golfe-Juan, ad corticem uvidem Bambusae, Villa des Cocotiers, Febrero, 1899.

The type specimen is not at PC and has not been located.

Calonectria biseptata Döbbeler, Mitt. Bot. Staatssamml. München 14:58. 1978.

Type: New Guinea. Papua, Dist. Northern, Subdist. Kokoda, eastern side lake Myola No. 1, (9° 10' S, 147° 45' E), submontane rainforest, 2000 m, auf *Dawsonia grandis*, gemeinsam mit *Bryorella crassitecta* und *Calonectria phycophora*, 23. VII. 1974 J. R. CROFT et al. (LAE 61975), (-), (Holotypus M).

The holotype specimen of this recently described species has not been examined. This species was placed in *Calonectria* solely on the basis of the multiseptate ascospores. From the description and illustration, it appears to be unlike *Calonectria pyrochroa*, (= *C. daldiniana*, the monotype species of *Calonectria*) (Rossman, 1979) and should be placed with allied species in the genus *Nectria*.

Calonectria bloxami (Berk. & Br.) Sacc., Nuovo Giorn. Bot. Ital. 7:23. 1875.

= *Nectria bloxami* Berk. & Br., Ann. Mag. Nat. Hist. ser. 2, 13:467. 1854.

= *Nectriella bloxami* (Berk. & Br.) Fuckel, Jahrb. Nassauischen Vereins Naturk. 29-30:21. 1875.

= *Dialonectria bloxami* (Berk. & Br.) Cooke, Grevillea 12:100. 1884.

= *NECTRIA ARENULA* (Berk. & Br.) Berk., Outl. Brit. Fung. p. 394. 1860.

Type: England. Twycross, on dead stems of herbaceous plants, Rev. A. Bloxam, Brit. F. #781.

After examining the holotype (K) and authentic specimens (K, PC), I agree with Booth (1959) who stated that *Nectria bloxami* is a synonym of *N. arenula*. *N. arenula* is redescribed and illustrated by Samuels (1978) and Booth (1959). Many specimens labelled *N. bloxami* are *Nectriella sceptri* (= *Calonectria sceptri*) including Rehm, Ascomyceten #1466 (BR, CUP, FH-H, S) issued as *C. bloxami*.

[*Calonectria bloxami* var. *umbelliferarum* Höhnelt, Ann. Mycol. 2:49. 1904. nom. prov.]

= *Charonectria umbelliferarum* Höhnelt, Hedwigia 42:187. 1903.

Type: Austria. Tirol, an durren Umbelliferen-Stengeln, Tumpener See im Ötztal.

The holotype specimen (FH-H) has the additional information "Aug. 99, Höhnelt, 27 XII 1902". This specimen contains only a few bumps which suggest *Nectriella* (= *Charonectria* Sacc. fide Seaver, 1909a) but it is too scanty to be identified accurately. Rehm, Ascomyceten #1867 issued as *Charonectria? umbelliferarum* (CUP, FH-H) is a *Nectriella* with a ring of short, thick hyphae around the ostiole. Höhnelt (1904) stated that *Pseudodiplodia umbelliferarum* Höhnelt may be the imperfect state of *Charonectria umbelliferarum* and that, according to Rehm, this species should be a variety of *Calonectria bloxami*, which Höhnelt, therefore, proposed provisionally.

Calonectria blumenaviae P. Henn., Hedwigia 41:6. 1902.

Type: Brazil. St. Catherine bei Blumenau auf Bambusstamm. Marz, 1891. No. 47.

In FH-H there is a specimen which is undoubtedly a fragment of the holotype "ex Herb. Berlin" but no hypocreaceous fungus is left. The specimen at B apparently no longer exists. The description suggests *Nectria calami* (= *Calonectria calami*) but without a type specimen, this cannot be accurately determined.

Calonectria brongniartii (Crouan & Crouan) Sacc., *Michelia* 1:314. 1878.

= *Nectria brongniartii* Crouan & Crouan, *Florule du Finistère* p. 37. 1867.

= *PSEUDONECTRIA BRONGNIARTII* (Crouan & Crouan) Dobb., *Mitt. Bot. Staatssamml. München* 14:98. 1978.

Type: France. Finistère, sur le *Frullania dilatata*, sur un vieux Houx, aut. r. r.

The holotype and isotype specimens have been examined at CO. I agree with the placement of this species in *Pseudonectria* by Döbbeler (1978) who presented a detailed description, illustrations and synonyms of this species.

Calonectria bryophila Rossm., *Mycologia* 69:364. 1977.

= *Ophionectria muscivora* Petch, *Trans. Brit. Mycol. Soc.* 27:142. 1945.

= *NECTRIA BYSSOPHILA* Rossman, *nom. nov.*

Type: Ceylon. On moss on tree trunks, Nuwara Eliya, 19 June 1927.

The holotype specimen (K) has been examined. This species is quite unlike *Calonectria pyrochroa* (= *C. daldiniana*, the monotype species of *Calonectria*) (Rossman, 1979). *Nectria byssophila* belongs in the *Nectria muscivora*-group as delimited by Samuels (1976a). *Nectria bryophila* (Desm.) Sacc., 1878, and *Nectria muscivora* (= *Calonectria muscivora*) require that this species be given a new specific epithet when placed in *Nectria*. Occurring on moss, the yellow-orange ascocarps are partially immersed in a byssoid stroma, as suggested by the new epithet. The ascocarps are composed of small, thin-walled cells with an outer prosenchymatous layer of hyphae. The asci are unitunicate and the ascospores are very long-fusiform, curved to sigmoid, up to thirteen septate, 125-230 x 2-2.5 µm.

Calonectria calami P. Henn. & E. Nym. in O. Warburg, *Monsunia* 1:163. 1899.

= *NECTRIA CALAMI* (P. Henn. & E. Nym.) Rossman, *comb. nov.*

= *Calonectria oodes* Petch, *Ann. Roy. Bot. Gard. Peradeniya* 7:135. 1920.

= *Calonectria ignota* Chardon, *Scientific Survey of Porto Rico and Virgin Islands* 8:41. 1926.

= *Calonectria kampalensis* Hansf., *Proc. Linn. Soc. Lond.* 153:34. 1941.

Type: Java. Hort. Bogor auf Blattscheiden von *Calamus* sp., 4 März 1898. (E. Nyman)

There are two isotype specimens at FH, one in the Höhnell collection with slides and one in the general herbarium. Because the holotype at B, studied by Weese (1927), was apparently destroyed, the isotype specimen in FH-G is here designated the LECTOTYPE. This is a good hypocreaceous species but is quite unlike the type of *Calonectria*, *C. pyrochroa* (= *C. daldiniana*), as redescribed by Rossman (1979). Although similar to *Nectria pseudopeziza* (= *C. pseudopeziza*), *Nectria calami* is differen-

tiated by the smaller, orange ascocarps which become collabent when dry, the ascocarp wall having a middle, pigmented layer, ascospores $19-30 \times 4-5 \mu\text{m}$, and occurrence on monocot wood.

Calonectria callorioides Penz. & Sacc., Malpighia 11:515. 1897.

Type: Java. In Horto bot. Bogoriensi, in culmis v. caulibus *Monocotyledum* superficie atratis, socia *Chaetosphaeria* (C.). Habitus *Orbilae* v. *Calloriae*.

The holotype specimen at PAD no longer contains any suitable fungus and the isotype at FH-H is in very poor condition. The remnant of a white, translucent ascocarp has questionably unitunicate asci with a distinct apical ring, and hyaline, fusiform ascospores, $27-29 \times 3.5-4 \mu\text{m}$, which are 3- to 5-septate. The illustrations in the type description suggest that the asci are bitunicate. Without a better type specimen, this species cannot be accurately characterized.

Calonectria camelliae Shipton, Trans. Brit. Mycol. Soc. 72:163. 1979.

See addendum on page 556.

Calonectria canadensis (Ellis & Everh.) Berl. & Vogl., Add. Saccardo's Syll. Fung. p. 212. 1886.

= *NECTRIA CANADENSIS* Ellis & Everh., Bull. Torrey Bot. Club 11:74. 1884.

= *Scolecconectria canadensis* (Ellis & Everh.) Seaver, Mycologia 1:199. 1909.

Type: Canada. Ottawa, on bark of elm limbs, August, 1883. Macoun (No. 311).

The holotype specimen has not been located and a probable isotype labelled *Sphaerostilbe canadensis* "Mus. bot. Berol. ex Herb. Ellis" (FH-H) has no fungus left. Authentic specimens (DAOM, NY-both Macoun #225 coll. September 28, 1883) and many exsiccati specimens issued by Ellis & Everhart reveal *Nectria canadensis* to be a member of the *Nectria aquifolii*-group as defined by Booth (1959). Like *Nectria aurantiaca* (Tul.) Jaczewski, *N. canadensis* occurs on *Ulmus* sp. and has a stilboid anamorph, ascocarps on a well-developed stroma, an ascocarp wall structure like *N. aurantiaca* and ascospores which bud outside the ascus, filling the ascocarp with ascospores. Differences between these species are based mainly on ascospore size and septation. If the *Nectria aquifolii*-group were recognized as a separate genus, these species would be placed in *Scolecconectria*. However, because of the close relationship of this group to the *Nectria cinnabarina*-group as delimited by Booth (1959), which includes *N. cinnabarina* (Tode ex Fries) Fries, type species of *Nectria*, all species of the *N. aquifolii*-group should be retained in *Nectria*, regardless of ascospore septation. *Nectria canadensis* was distributed as Ellis & Everh., North Amer. Fungi, second series #2547 (BPI, CUP, OSC), Ellis & Everh., Fungi Columbiana #25 (BPI, CUP) and #226 (BPI, CUP, FH-ex), the last two numbers as *Calonectria canadensis*.

Calonectria capensis Doidge, Bothalia 1:218. 1921

= *BYSSOCALLIS CAPENSIS* (Doidge) Rossman, comb. nov.

Type: Republic of South Africa. Cape Province, Humansdorp District, Storms River, parasitic on *Irene Podocarpi* on leaves of *Podocarpus elongata*, 15.5.23. Doidge (17167).

The holotype specimen (PREM) has bright-yellow, fleshy ascocarps and bitunicate asci. This species belongs in the Pleosporales, close to *Melioliphila*, but, due to the bright-yellow hyphae and ascocarps, is more correctly placed in the related genus *Byssocallis* H. Syd. Unlike *B. phoebes*, the type species of *Byssocallis*, *B. capensis* lacks setae on the ascocarp and has an associated *Eriomycopsis* anamorph as do several *Melioliphila* species.

Calonectria celata Döb., Mitt. Bot. Staatssamml. München 14:61. 1978.

Type: Germany. Bayern, Oberbayern, Chiemgauer Alpen, nordseitige Kalkfelsabbrüche am Weg von der Schlechtenberger Alm nach Hohenaschau, 900 - 1000 m, gemeinsam mit *Micarea cyane-scens* und *Myxophora amerospora*, 29.IX.1974 J. POELT (Holotypus GZU; Isotypus Dö 1890).

The holotype specimen of this recently described species has not been examined. This species was placed in *Calonectria* solely on the basis of the multiseptate ascospores. From the description and illustration, it appears to be unlike *Calonectria pyrochroa* (= *C. daldiniana*, the monotype species of *Calonectria*) (Rossman, 1979), and should be placed with allied species in the genus *Nectria*.

Calonectria cephalosporii Hansf., Mycol. Pap. 15:117. 1946.

= *NECTRIA LEUCORRHODINA* (Mont.) Samuels, Mem. New York Bot. Gard. 26:90. 1976.

Type: Uganda. Kawanda, in plagulis *Meliolae markhamiae* in foliis *Markhamiae platycalycis*, Hansford no. 2554.

Although said by Hansford to be deposited in IMI, the holotype specimen could not be located there. Several authentic specimens examined at (BPI: Hansf. 3293, 3435, 3552; IMI: Hansf. 2699, 3293; PREM: Hansf. 3293, 3552) and the type description prove this species to be a later synonym of *Nectria leucorrhodina* (= *Calonectria leucorrhodina*). Hansford (1946) separated *Calonectria limpida* (= *N. leucorrhodina*) from *C. cephalosporii* "mainly by the constant presence of the conidial state" in the latter. Hansford grew the fungus in culture from both conidia and ascospores but was unable to induce perithecial formation. Gams (1971) examined the *Cephalosporium* anamorph of many collections identified as *C. cephalosporii* and suggested that this imperfect was not a typical *Acremonium* (= *Cephalosporium*) but that without a living culture its taxonomic position could not be determined. *Calonectria ukolayii*, another synonym of *Nectria leucorrhodina*, also has this *Acremonium*-like anamorph, which is described as *Cylindrocarpon ukolayii* Thaug. The phialidic anamorph apparently belongs to *Nectria leucorrhodina*.

Calonectria cerea (Berk. & Curt.) Sacc., Syll. Fung. 2:551. 1883.

= *Sphaeria cerea* Berk. & Curt., Grevillea 4:108. 1876.

= *TUBEUFIA CEREAE* (Berk. & Curt.) Hohnel, Akad. Wiss.

Wien Sitzungsber., Math.-Naturwiss. Kl., Abt. 1, 128:562. 1919.

= *Calonectria fulvida* (Ellis & Everh.) Berl. & Vogl., Add. Saccardo's Syll. Fung. p. 212. 1886.

= *Nectria fulvida* Ellis & Everh., J. Mycol. 1:140. 1885.

= *Dialonectria fulvida* (Ellis & Everh.) Ellis & Everh., J. Mycol. 2:122. 1886.

Type: United States. North Carolina, parasitic on *Sphaeria* (*Diatrype*) *stigma*, Car. Inf. #2315.

The scanty, holotype specimen at K was examined only macroscopically. Booth (1964) examined this specimen and has accurately characterized the species which seems to be correctly placed in *Tubeufia* (Pleosporales). Unlike the type species of *Tubeufia*, *T. paludosa* (Crouan & Crouan) Rossm. (= *T. javanica* Penz. & Sacc.) which has translucent, white ascocarps, *T. cerea* has yellow-brown ascocarps covered with a yellow scurf. Both species are associated with helicosporous anamorphs. For a description, illustrations and complete list of synonyms of *T. cerea*, see Booth (1964) and Rossman (1977).

Calonectria chlorinella (Cooke) Sacc., Syll. Fung. 2:543. 1883.

= *Nectria chlorinella* Cooke, Grevillea 11:108. 1883.

= *THYRONECTRIA CHLORINELLA* (Cooke) Seeler, J. Arnold Arbor. 21:444. 1940.

Type: United States. seaboard of South Carolina, on bark of *Ulmus Americanus*.

In the original publication the author is cited as "Cooke in Rav. Fungi Amer., No. 736." I have examined specimens of this exsiccati number at BPI, CUP, NY and FH-G. Seeler (1940) considered the specimens at K and FH to be types. Based on ascospore septation, this species is correctly placed in *Thyronectria*; However, it is related to members of the *Nectria aquifolii*-group as delimited by Booth (1959). The muriform, primary ascospores bud in the ascus and the ascocarps are covered with a green-yellow scurf. Ellis & Everhart, North Amer. Fungi, second series #2546 issued as *C. chlorinella* (BPI, CUP, OSC) is *Thyronectria xanthoxyl* (Peck) Ellis & Everh., and Ellis & Everhart, Fungi Columbiana #2006 issued as *C. chlorinella* (BPI, CUP, NY, NYS) is *Herpotrichia mutabilis* (Pers. ex Fries) Winter, as are many other specimens deposited as *C. chlorinella*.

Calonectria chorleyi Hansf., Mycol. Pap. 15:124. 1946.

= *MELIOLIPHILA VOLUTELLA* (Berk. & Br.) Rossm., Mycotaxon 8:551. 1979.

Type: Uganda. Mukono, Kiagwe, in plagulis *Meliolae coffeae*, in foliis *Coffeae*, Hansford no. 3032.

I have examined a slide of the holotype specimen at IMI and an authentic specimen (BPI: Hansf. 3562). The white, setose ascocarps contain bitunicate asci and 3-septate, fusiform ascospores and are associated with an *Eriomyces* anamorph. This name is found to be a synonym of *Melioliphila volutella* (= *Calonectria volutella*).

Calonectria ciliatum (Link) Snyder & Hansen, Amer. J. Bot. 32:664. 1945.

Automatic type: type specimen of *Fusarium ciliatum* Link.

This *Calonectria* name is incorrect and cannot be used for the ascigerous state because the new combination is based on *Fusarium ciliatum*, a *nomen anamorphosum*.

Calonectria cinnabarina P. Henn., Hedwigia 36:220. 1897.
= *OPHIONECTRIA TRICHOSPORA* (Berk. & Br.) Sacc., Michelia 1:323. 1878.

Type: Brazil. St. Cathar. pr. Blumenau auf Baumrinden. A. Möller n. 229.

The type specimen in FH-G has been designated the lectotype (Rossman, 1977) with isoelectotypes at FH-P, NY and S. These specimens have a bright-orange subiculum from which sporulates the anamorph of *Ophionectria trichospora*, *Antipodium spectabile* Piroz. *O. trichospora*, the monotype species of *Ophionectria*, was redescribed and illustrated by Rossman (1977).

Calonectria circumposita Kirschst., Verh. Bot. Vereins Prov. Brandenburg 48:59. 1907.

Type: Germany. Auf faulender Pappe in der Rathenower Stadtforst. 16.10.04.

The holotype specimen is not at B and has not been located.

Calonectria citrinoaurantia (Delacr.) Sacc., Michelia 1:314. 1878.

= *NECTRIA CITRINO-AURANTIA* Delacr. in Desm., Pl. Crypt. France ser. 3, #778. 1860.

Type: France. Sur les Saules à Vannerie, à Saint-Romain-sur-Vienne, Février, 1859.

Specimens of this exsiccata number have been examined from BPI and BR. Of the three isotype specimens on one herbarium sheet at BR, I have marked the top specimen and here designate it the LECTOTYPE; the other specimens of this number become isoelectotypes. Rabenhorst, Fungi europaei #325 labelled "ad ramulos salicinos, Februario 1859, St. Romani - ad - Vignennam, in agro pictax. legebat T. de Lacroix Pter", is apparently the same collection and was examined from BPI, BR, FH-H, NY and S. This species has small, translucent-yellow ascocarps crowded on a well-developed stroma, unitunicate asci and hyaline, one-septate ascospores. Petch (1938) and Booth (1959) have redescribed and illustrated *Nectria citrino-aurantia*.

Calonectria coccidophaga Petch, Trans. Brit. Mycol. Soc. 7: 161. 1921.

= *NECTRIA COCCIDOPHAGA* (Petch) Rossman, *comb. nov.*

Type: Australia. Victoria, Warburton, on *Planchoma acaciae*, on *Acacia* sp., April 30, 1917 (Coll. J. Farrell). Submitted by C. C. Brittlebank.

The holotype (K) and an isotype specimen (FH-G as '*coccidophaga*') were examined. This species is hypocreaceous belonging in *Nectria*. The red-orange ascocarps are immersed in a well-developed stroma covering the scale insects. The wall of the ascocarp becomes purple in 2% KOH while the darker stroma does not. The asci are unitunicate, clavate, without any apical apparatus; the ascospores are ellipsoid, 10-17 x 6-8 μ m, 3-septate, slightly constricted at the middle septum. Petch (1921) described the associated fungus, *Microcera tasmaniensis* McAlp., which appears to be a *Fusarium*. *Nectria coccidophaga* is certainly not a synonym of *Gibberella pulicaris* (Fries) Sacc., as stated by Wollenweber & Reinking (1935).

Calonectria coffeae A. W. Zimm., Centralbl. Bakterirol., 2. Abth. 7:139. 1901.

Type: Java. Buitenzorg, auf der Rinde von *Coffea arabica*.

The holotype specimen was not at B and has not been located.

CALONECTRIA COLHOUNII Peeraly, Trans. Brit. Mycol. Soc. 61:92. 1973.

Type: Mauritius. In foliis *Thea sinensis* L., Wooton, 1970. Holotypus IMI 167581.

I have examined slides of the holotype at IMI. This species belongs in *Calonectria* as circumscribed by Rossman (1979) and is related to the type species *C. pyrochroa* (= *C. daldiniana*). *C. colhounii* has a *Cylindrocladium* anamorph which causes a disease of tea. This species is redescribed and illustrated by Peeraly (1974e).

Calonectria collapsa Starb., Bih. Kongl. Svenska Vetensk.-Akad. Handl. 25:29. 1899.

= *NECTRIA COLLAPSA* (Starb.) Rossman, *comb. nov.*

Type: Brazil. Rio Grande do Sul, col. Ijuhy in trunco humi jacente, 29/3 93. No. 305.

The holotype specimen (S) was examined and found to be a *Nectria* with unknown affinities. The dark-yellow ascocarps have a distinct collar around the apex, are immersed in a white byssus and are associated with a stilbaceous anamorph. The unitunicate, clavate asci contain one-septate, fusiform, punctate ascospores, 13-15 x 4-4.5 μ m.

Calonectria copelandii P. Henn., Hedwigia 47:253. 1908.

Type: Philippines. Mindanao, Santa Cruz in foliis Orchidaceae 1316. April 1904 (Copeland n. 1317).

I have examined isotype specimens at BPI, FH-H, K and NY. I have been unable to find the described fungus on any of them.

Calonectria coralloides Maubl., Bol. Agric. (Sao Paulo) 16:315. 1915.

= *MELIOLIPHILA CORALLOIDES* (Maubl.) Rossman, comb. nov.

= *Paranectria coralloides* (Maubl.) Hansf., Mycol. Pap. 15:130. 1946.

Type: Brazil. In *Meliola* sp. (immatura) ad folia *Melastomataceae* cujusdam socio *Trichothyrio fimbriato*, Speg, Rio de Janeiro. (Exs. 640. Dec. 1912).

In a later publication about this species, Maublanc (1920) cited the type specimen as "In foliis *Clidemiae hirtae* G. Don, supra mycelium *Meliolae Melastomacearum* Speg.,... (no. 353)." A presumed isotype specimen (FH-P) with collection data matching parts of both descriptions has a printed label titled "A. Maublanc - Fungi Brasiliensis 353" and may be part of an exsiccati set. Because this was the only possible type encountered, the specimen in FH-P is here designated the LECTOTYPE. Hansford's combination was based solely on Maublanc's descriptions and drawings. *Melioliphila coralloides* has small, fleshy, white ascocarps, bitunicate asci and fusiform, attenuate, three-septate ascospores. Although the ends of the ascospores are attenuate, they do not have cellular appendages or distinct cilia as in *Paranectriella*, a genus erected for species of *Paranectria sensu* Hansford (Pirozynski, 1976). Several species of *Melioliphila* have ascospores with elongate, tapering ends. *M. coralloides* is distinguished by the coralloid appendages on the ascocarps.

Calonectria cremea A. W. Zimm., Centralbl. Bakteriöl., 2. Abth. 7:140. 1901.

= *NECTRIA RIGIDIUSCULA* Berk. & Br., J. Linn. Soc., Bot. 14:116. 1873.

Type: Java. Buitenzorg, auf abgestorbenen Früchten von *Theobroma cacao*.

The holotype specimen is not at B and could not be located. Weese (1924) stated that this species is the smooth form of *Calonectria sulcata*, a synonym of *Nectria rigidiuscula* (= *C. rigidiuscula*). Wollenweber & Reinking (1935) considered *C. cremea* a synonym of *C. rigidiuscula*. Based on the above authors's opinions, the type description, illustrations and host, I accept the synonymy of *C. cremea* with *N. rigidiuscula*, a common, tropical saprophyte on woody substrates.

Calonectria crescentiae Seaver & Waterston, Mycologia 32:404. 1940.

= *NECTRIA ERUBESCENS* (Desm.) Phill. & Plowr., Grevillea 10:70. 1881.

Type: Bermuda. Smith's Parish, on a weathered shell or fruit rind of the calabash, *Crescentia cujete* L., Dec. 9, 1938.

Isotype specimens (BPI, K, NY) were examined. Samuels (1978) listed isotype specimens at NY which he examined. I have marked the one with Seaver's notes, illustrations and photographs as the LECTOTYPE. In agreement with Samuels (1978), I find this name to be a later synonym of *Nectria erubescens* (= *Calonectria erubescens*) in the *Nectria arenula*-group as delimited by Booth (1959) and Samuels (1978). Samuels (1978) redescribed and illustrated both the teleomorph and anamorph of *Nectria erubescens*.

CALONECTRIA CROTALARIAE (Loos) Bell & Sobers, Phytopathology 56:1364. 1966.

= *C. theae* Loos var. *crotalariae* Loos, Trans. Brit. Mycol. Soc. 33:17. 1950.

Type: Ceylon. On stems of *Crotalaria anagyroides* and *Tephrosia vogelii*.

A possible type specimen at IMI was examined and found to belong in *Calonectria* as delimited by Rossman (1979). *C. crotalariae* was described and illustrated by Peerally (1974d). This species has a *Cylindrocadium* anamorph which is similar to that of *Calonectria pyrochroa*.

Calonectria cucurbitula (Tode ex Fries) Sacc., Michelia 1:312. 1878.

= *Sphaeria cucurbitula* Tode ex Fries, Systema Mycol. 2:415. 1823.

= *SCOLECONECTRIA CUCURBITULA* (Tode ex Fries) Booth, Mycol. Pap. 73:15. 1959.

Type: Sweden. In cortice arborum frondosarum raro; frequens in Pino & Melia Azederach.

The type collection of *Sphaeria cucurbitula* was issued in 1822 as Fries, Scleromyceti Sueciae #263. Booth (1959) has redescribed and illustrated *Scoleconectria cucurbitula*. He designated the specimen at K the lectotype. I have examined an isolectotype (BPI) which agrees well with Booth's description. This is the type and only species in *Scoleconectria*, a genus which could be used to accommodate the *Nectria aquifolii*-group as delimited by Booth (1959). *S. cucurbitula* is related to *Thyronectria balsamea* (= *C. balsamea*), differentiated by the slightly longer, narrower ascospores with irregularly-transverse septa.

Calonectria curtisii (Berk.) Sacc., Michelia 1:316. 1878.

= *Nectria curtisii* Berk., Grevillea 4:46. 1875.

= *NECTRIELLA SCEPTRI* (Karst.) Rossm., Mycotaxon 8:542. 1979.

Type: United States. South Carolina, on *Zea*. Car. Inf. No. 3795.

An isotype specimen (FH-C) was examined. This name is found to be a later synonym of *Nectriella sceptri* (= *Calonectria sceptri*).

Calonectria cyathula H. Syd., Ann. Mycol. 37:224. 1939.

= *NECTRIA CYATHULA* (H. Syd.) Rossman, comb. nov.

Type: Sierra Leone. Njala, parasitica in stromate Phyllochorae spec. ad folia viva Harunganae madagascariensis, 19. X. 1935, leg. F. C. Deighton (no. 864, typus).

I have examined the holotype and authentic specimens (IMI). This species has small, translucent-red ascocarps and belongs in the *Nectria epispheria*-group as delimited by Booth (1959).

Calonectria dacrymycella (Nyl.) Sacc., Michelia 1:314. 1878.

= *Sphaeria dacrymycella* Nyl., Flora 46:322. 1863.

= *Nectria dacrymycella* (Nyl.) Karst. [ut 'Nyl.'], Fungi Fenn. exs. #667. 1867.

= *Nectriella dacrymycella* (Nyl.) Rehm, Ascomyceten #232. 1874.

Type: Finland. Ad caules *Urticae* in Tavastia (P. A. Karsten).

I have been unable to locate the type specimen of this species; it is not at H. Many specimens deposited as *Nectriella dacrymycella* including Rehm, Ascomyceten #232 and #232b (BPI, NY, S) and Thumen, Mycotheca Universalis #1064 (NY, NYS) are *Nectriella sceptri* (= *Calonectria sceptri*). If the type specimen of *N. dacrymycella* is identical with *N. sceptri*, *N. dacrymycella* will provide an earlier epithet for the species.

Calonectria dacrymycella (Nyl.) Sacc. f. *aconiti* (Sacc.) Rehm, Ascomyceten #1868. 1909.

= *Nectria dacrymycella* (Nyl.) Sacc. f. *aconiti* Sacc., Syll. Fung. 2:490. 1883.

= *NECTRIELLA SCEPTRI* (Karst.) Rossm., Mycotaxon 8:542. 1979.

Type: Italy. In caulibus *Aconiti Napelli* socia *Leptosphaeria modesta*, in alpinis Vette di Feltre, (BIZZOZERO).

The holotype specimen could not be located. Specimens of Rehm, Ascomyceten #1868 were examined (BPI, CUP, FH, NY, PACA, S) and found to be *Nectriella sceptri* (= *Calonectria sceptri*). Specimens of this form are similar to *Nectriella dacrymycella sensu* Rehm (= *Nectriella sceptri*) but the ascospores tend to be slightly larger. I have found the size of ascospores in specimens of *N. sceptri* to be variable, ranging continuously from 10-25 μ m, thus including *C. dacrymycella* f. *aconiti* within the range.

Calonectria daldiniana de Not., Comment. Soc. Crittogam.

Ital. 2:477. 1867.

= *CALONECTRIA PYROCHROA* (Desm.) Sacc., Michelia 1:308. 1878.

Type: Italy. Su foglie sternate di *Magnolia grandiflora* a Locarno, Daldini.

This is the monotype species of *Calonectria*. The holotype specimen (RO-general mycological herbarium) was examined and this name is found to be a later synonym of *Calonectria pyrochroa*. The scanty, holotype specimen of *C. daldiniana* and the species *C. pyrochroa* with its *Cylindrocladium* anamorph are redescribed and illustrated by Rossman (1979).

Calonectria dearnessii Ellis & Everh., Proc. Acad. Nat. Sci.

Philadelphia 42:245. 1891.

= *NECTRIA DECORA* (Wallr.) Fuckel, Jahrb. Nassauischen Vereins Naturk. 23-24:179. 1870.

Type: Canada. London, on decaying branches, Jan., 1890.

J. Dearness No. 1346. Caespitose on ostiole of some *Massaria* on ash and elm.

The holotype specimen is at NY and reveals this name to be a later synonym of *Nectria decora* (= *Calonectria decora*) as first suggested by Weese (1914a). Authentic specimens, collected in February, 1890, were issued as Ellis & Everhart, North Amer. Fungi, second ser. #2548 (BPI, CUP, FH-G, OSC) and Ellis & Everhart, Fungi Columbiana #818 (BPI, CUP, FH-G). All are *Nectria decora*.

Calonectria decora (Wallr.) Sacc., Michelia 1:310. 1878.

= *Sphaeria decora* Wallr., Fl. Crypt. Germ. 2:842. 1833.

= *NECTRIA DECORA* (Wallr.) Fuckel, Jahrb. Nassauischen Vereins Naturk. 23-24:179. 1870.

= *Calonectria agnina* (Rob. ex Desm.) Sacc., Michelia 1:311. 1878.

= *Sphaeria agnina* Rob. ex Desm., Ann. Sci. Nat. Bot. ser. 3, 6:72. 1846.

= *Calonectria massariae* (Pass.) Sacc., Michelia 1:312. 1878.

= *Nectria massariae* Pass. in Rabenh., Fungi Europ. #1827. 1874.

= *Calonectria dearnessii* Ellis & Everh., Proc. Acad. Nat. Sci. Philadelphia 42:245. 1891.

Type: Germany. Ad *Aceris campestris* ramulos languidos Thrg. rariiss. no. 4057.

The holotype specimen has not been located. Weese (1914a) stated that the type was unobtainable but that Fuckel, Fungi Rhenani #986 agreed with it! Noone seems to have located or examined the type specimen but *Nectria decora* is consistently described and illustrated by Fuckel (1870), Weese (1914a), Wollenweber & Reinking (1935) and Pirozynski (1975). I have examined Fuckel, Fungi Rhenani #986 (B, BR, FH-H, UPS) and agree with their concept. Although occurring in the temperate zone, *Nectria decora* has affinities with the *Nectria subfalcata*-group as delimited by Samuels (1976a) which at

present, contains only tropical species. The light-yellow ascocarps are immersed in a white, byssoid stroma parasitic on *Massaria*. Herbar Barbey-Boissier #865 (BPI, BR, FH-G, NY, S, UPS), also Herbar Fuckel #1894-Fungi Rhenani #986, issued as *Calonectria decora* is *Nectria decora*. Seaver (1909a), Weese (1914a), Wollenweber & Reinking (1935) and Pirozynski (1975) list the numerous synonyms of *Nectria decora* but erred in synonymizing *Calonectria diminuta* with *C. decora* (= *N. decora*). Saccardo (1883) listed *C. pyrrochlora* Sacc. nec Auersw., as a synonym of *C. massariae* (= *N. decora*). *C. pyrrochlora* Sacc. is a *nomen nudum* and intentional later homonym of *C. pyrrochlora* (Auersw.) Sacc. (= *Thyronectria pyrrochlora*). This invalid species is listed as a synonym of *Nectria decora* by later authors.

Calonectria decora f. *parasitica* Hazsl., Magyarorszag Tarsorszagainak Sphaeriai p. 17. 1892.

Type: A *Massaria* *Popula tomlotokjainak csucsain* no.

The type specimen is not at BP and was apparently destroyed. Pirozynski (1975) considered this form a questionable synonym of *Calonectria decora* (= *Nectria decora*).

Calonectria diminuta (Berk.) Berl. & Vogl., Add. Saccardo's Syll. Fung. p. 213. 1886.
 = *Nectria diploa* Berk. & Curt. var. *diminuta* Berk., Grevillea 4:46. 1875.
 = *NECTRIA DIMINUTA* (Berk.) Sacc., Syll. Fung. 2:498. 1878.
 = *Dialonectria diminuta* (Berk.) Cooke, Grevillea 12:83. 1884.

Type: United States. South Carolina, Society Hill, on some *Sphaeria*. On alder. Car. Inf. No. 4029.

An isotype specimen at FH-C labelled "*Nectria diploa* B. & C. (4029) on *Alno emortus*. Nov. 1853. Society Hill, S. C." was examined. This is taken to be type material of *Nectria diminuta*. *N. diminuta* belongs in the *Nectria episphaeria*-group as delimited by Booth (1959). Specimens of *Nectria diminuta* were issued as *N. diploa* in Ravenel, Fungi Carol. exs., fasc. III #55 (BPI, NY). *Nectria diminuta* has been mistakenly synonymized with *Calonectria decora* (= *Nectria decora*). When Seaver (1909a) described *Calonectria diminuta*, he examined only specimen of *C. dearnessii* which he considered a questionable synonym of *C. diminuta*. *C. dearnessii* is a synonym of *Nectria decora* (= *Calonectria decora*). Based on Seaver's description of *C. diminuta*, Weese (1914a) with some reservation, Wollenweber & Reinking (1935) and Pirozynski (1975) listed *C. diminuta* as a synonym of *Calonectria decora* (= *Nectria decora*).

Calonectria diploa (Berk. & Curt.) Wollenw., Angew. Bot. 8: 193. 1926.
 = *NECTRIA DIPLOA* Berk. & Curt., J. Linn. Soc., Bot. 10:378. 1869.

Type: Cuba. On bark. Cuban Fungi #767. (= Wright #606).

In the original description Berkeley (1869) listed Wright #606 as the type specimen but also cited "Car. Inf., no. 4029" which later became the type of *N. diploa* var. *diminuta*. These specimens are different species and only Wright #606 from Cuba is considered the type collection of *N. diploa*. Isotype specimens at FH-C and NYS were examined; others are housed at K, according to Booth (1971). *Nectria diploa* is related to *N. flammea* (Tul.) Dingley and *N. auranticola* Berk. & Br., all having *Fusarium* anamorphs and occurring on scale insects. Booth (1971) described and illustrated *N. diploa* and related species. Petch (1921), Wollenweber (1926), Wollenweber & Reinking (1935) and Booth (1971) list many synonyms which I have not confirmed.

Calonectria discophora Höhnelt & Weese, Sitzungsber. Kaiserl. Akad. Wiss., Math.-Naturwiss. Cl., Abt. 1, 125:532. 1916.
Type: Java. Tjibodas, 1908. auf einem faulenden, fast ent-rindeten Holzstücke, coll. Höhnelt.

The holotype specimen at FH-H is in poor condition and was not examined microscopically. From the description and macroscopic appearance, this species apparently belongs in the *Nectria mammoidea*-group as delimited by Booth (1959).

Calonectria dolichospora Sacc. & Trott., Syll. Fung. 22:490. 1913.
= *Calonectria macrospora* Rick, Broteria 5:41. 1906, non *C. macrospora* Sacc. & Speg., 1878 vel *C. macrospora* (P. Henn. & E. Nym.) Weese, 1910.

Type: Brazil. Rio Grande do Sul, in foliis putridis palmae.

This name was erected to legitimize Rick's species. I have been unable to locate the holotype specimen.

Calonectria duplicella (Nyl.) Karst., Bidrag Kännedom Finlands Natur Folk 23:218. 1873.
= *Sphaeria duplicella* Nyl., Not. Sällsk. Fauna Fl. Fenn. Förh. 10:89. 1868.
= *ABSCONDITELLA DUPLICELLA* (Nyl.) Rossman, comb. nov.

Type: Finland. In Lapponia orientali extrema, ad Ponoï, supra caespites Jungermanniarum (N. I. Fellman).

The holotype specimen (H) was examined. Isotype slides are deposited at FH-G. This species was found to be ostropalean and, after consultation with M. A. Sherwood, is placed in *Abseonditella*. *Abseonditella* was erected in 1965 for *A. sphagnorum* which, like *A. duplicella*, occurs on bryophytes and is weakly lichenized. Macroscopically similar to *A. sphagnorum* (Sherwood, 1977), *A. duplicella* is differentiated by the longer, multiseptate ascospores which are 35-50 x 9-10 µm, 3- to 7-septate. Racovitza (1959) and Döbbeler (1978) included this species as a *Calonectria* without examining the type specimen.

Calonectria eburnea Rehm, Hedwigia 37:196. 1898.

= *NECTRIA RIGIDIUSCULA* Berk. & Br., J. Linn. Soc., Bot. 14:116. 1873.

Type: Brazil. Pedras Grandes, an Baumrinde im Wald. Ule no. 1582c. H. B.

The holotype specimen at B was apparently destroyed. An isotype specimen at FH-H is labelled "Herb. Berlin" and is here designated the LECTOTYPE. An examination of this specimen reveals that *C. eburnea* is a later synonym of *Nectria rigidiuscula* (= *C. rigidiuscula*) as suggested by Weese (1927) and Wollenweber & Reinking (1935).

Calonectria ecuadorica Petrak, Sydowia 4:463. 1950.

= *NECTRIA ALBOSUCCINEA* (Pat.) Rossm., Mycotaxon 8:487. 1979.

Type: Ecuador. Prov. Tungurahua: Hacienda San Antonio bei Banos, auf berindeten, am Boden liegenden, faulen Asten, 10. I. 1938, Nr. 712b.

The holotype specimen may exist at W but Petrak's specimens are not yet available for study. An isotype specimen (ZT) was examined. This name is found to be a later synonym of *Nectria albosuccinea* (= *Calonectria albosuccinea*), the type specimen of which was collected in Ecuador. The isotype specimen of *C. ecuadorica* lacks a dark base on the ascocarp but this may be due to differences in substrate or state of maturity.

Calonectria effugiens Penz. & Sacc., Malpighia 6:515. 1897.

= *TUBEUFIA PALUDOSA* (Crouan & Crouan) Rossm., Mycologia 69:383. 1977.

Type: Java. In caulibus *Monocotyledonum* emortuis in Horto Bogoriensi 2. I. 97 (n. 219).

The holotype specimen (PAD) was examined but few ascocarps are left. A fragmentary isotype specimen at FH-H contained no fungus but the isotype slide (FH-H) was useful. The ascocarp wall structure of *C. effugiens* is similar to *Tubeufia paludosa* composed of thin-walled, horizontally-elongated cells. In addition, the ascocarps occur on monocotyledonous wood and are associated with dematiaceous hyphae and *Alternaria* and *Acrodictys*-like conidia. Because the specimen is immature, the minutely-striate ascospores, which measure 45-60 x 4.5-5 µm inside the ascus, are shorter than those of *T. paludosa*.

Calonectria epimyces (H. & P. Syd.) Sacc., Syll. Fung. 24:680. 1926.

= *HYALOCREA EPIMYCES* H. & P. Syd., Ann. Mycol. 15:214. 1917.

Type: Philippines. Mt. Makiling, prov. Laguna, in superficie stromatis Catacaumatis Elmeri ad folia Fici minahassae, 7. 1916, leg. C. F. Baker no. 4358.

An isotype specimen at FH-G "ex Herb. Theissen" is labelled no. 4358. In addition, isotype specimens were issued as "*Hyalocrea epimyces* Syd. n. gen. & n. sp.," C. F. Baker, Fungi Malayana #541 (BPI, CUP, FH-G) having the same collection data as in the original description. *Hyalocrea epimyces*, the monotype species of *Hyalocrea*, belongs in the Dothideales as suggested by the saccate, bitunicate asci, few asci per ascocarp and lack of pseudoparaphyses. The small, translucent ascocarps have large, triangular hairs around the apex; the broad, elliptical ascospores are three-septate, 38-48 x 16-18 μ m.

Calonectria equiseti Starb., Ark. Bot. 5:10. 1905.

= *NECTRIA OCHROLEUCA* (Schw.) Berk., Grevillea 4:16. 1875.

Type: Argentina. Prov. Jujuy, Quinta pr. Laguna de la Brea in caulibus aridis Equiseti, 17/6 1901, No. 86.

The holotype specimen (S) was examined. This name is found to be a later synonym of *Nectria ochroleuca* which was redescribed and illustrated by Samuels (1976a).

Calonectria erubescens (Rob. ex Desm.) Sacc., Michelia 1:309. 1878.

= *Sphaeria erubescens* Rob. ex Desm., Ann. Sci. Nat. Bot. ser. 3, 6:72. 1846.

= *NECTRIA ERUBESCENS* (Rob. ex Desm.) Phill. & Plowr., Grevillea 10:70. 1881.

= *Calonectria umbelliferarum* Seaver, Mem. New York Bot. Gard. 6:507. 1916.

= *Calonectria crescentiae* Seaver & Waterston, Mycologia 32:404. 1940.

Type: France. Hab. in pagina inferiore foliorum *Ilicis aquifolii*. Autumno. Nob.

Desmazières, Pl. Crypt. France #1766, issued in 1849, is labelled "en automne, à la face inférieure des vieilles feuilles de Houx tombées à terre" with a reference to the article where *Sphaeria erubescens* is described. This exsiccati number is taken as the type collection; no other possible type specimens have been located. Isotype specimens have been examined from BPI, BR, IMI, NY and UPS. Samuels (1978) examined the isotype at NY and this specimen is here designated the LECTOTYPE. *Nectria erubescens* is a member of the *N. arenula*-group as delimited by Booth (1959) and Samuels (1978). *N. erubescens* has been redescribed, illustrated and discussed by Samuels (1978) who has cultured and described its *Cylindrocarpon* anamorph. Due to Ellis & Everhart's (1892) and Seaver's (1909a) mistaken concept of the species, many of the specimens in United States herbaria, identified as *Calonectria erubescens* are foliar hyperparasites belonging to the *Nectria leucorrhodina*-group as delimited by Samuels (1976a) or to the pleosporaceous genus *Melioliphila*.

Calonectria erysiphoides Berl. & Roum., Rev. Mycol. (Paris) 10:76. 1888.

= *MELIOLIPHILA ERYSIPOIDES* (Berl. & Roum.) Rossman, comb. nov.

Type: Philippines. Tonkino, parasitice in subiculo *Meliolae amphitrichae* in foliis adhuc vivis Citri Bigarradiae.

Specimens of Roumeguère, Fungi selecti exs. #4451 labelled "*Calonectria erysiphoides* sp. nov. Berl. & Roum." with collection data similar to those in the type description are considered isotypes. Isotype specimens have been examined from BPI, BR, FH-P and NY. This species has yellow-brown ascocarps covered with setae, bitunicate asci and clavate, three-septate ascospores. It is placed in *Melioliphila*, differing from all other species in the genus by the brown pigmentation of the ascocarps and hyphae. Hansford (1946) redescribed this species as a *Calonectria*.

Calonectria erythrina H. & P. Syd., Ann. Mycol. 10:81. 1912.

= *NECTRIA ERYTHRINA* (H. & P. Syd.) Rossman, comb. nov.

Type: Indonesia. Sud-Ost-Borneo, Hayoep, in corticibus et ad lignum putridum, 8. 6. 1908, leg. H. Winkler no. 2338.

The isotype specimens (FH-H, K) contain a hypocreaceous fungus which belongs in the *Nectria aquifolii*-group as delimited by Booth (1959). Aggregated on a well-developed stroma, the red-orange ascocarps are slightly roughened and deeply cupulate when dry, as are those of *Scoleonectria cucurbitula* (= *C. cucurbitula*) and *Thyronectria balsamea* (= *C. balsamea*). The ascospores are ellipsoid, faintly striate, 1- to 3-septate, 14-18 x 5-6 μ m, but do not bud in the ascus.

Calonectria eucalyptina Sousa da Camara & Gomes da Luz, Agron. Lusit. 1:48. 1939.

Type: Portugal. In cortice truncorum *Eucalypti* sp., pr. Synthia (Castela dos Mouros) leg. Silva Teixeira, aprili, 1937.

The holotype specimen could not be located.

Calonectria ferruginea Rehm, Hedwigia 39:225. 1900.

= *Trichopeltis ferruginea* (Rehm) Rehm, Hedwigia 44:1. 1904.

= *Cryptopeltis ferruginea* (Rehm) Rehm, Ann. Mycol. 4: 410. 1906.

= *PORINA LIMBULATA* (Kremp.) Vain., Ann. Acad. Sci. Fenn., ser. A 15:363. 1921.

Type: Brazil. Folia arboris (spec.). Rhoupalae Isola Sta. Catharina. Ule no. 602. - Folia Geonomatis H. Bresl. Pedras Grandes. Ule no. 1754. - Folia Xylopieae. Tijuca, Rio de Janeiro. Ule no. 2321 a. H. P. - Folia Dactyloctenionis verticillati. Rio de Janeiro. Ule no. 700b. - Folia Soroceae ilicifoliae. Tubarao. Ule no. 1507. H. Bresl.

Santesson (1952) selected Ule #602 (S) as the lectotype. I have not seen this specimen but Santesson examined it and concluded that this species is a later synonym of the lichen

Porina limbulata. I have examined some of the isoelectotype and paratype specimens: Ule #602 (B), Ule #1754 (B, BPI, FH-G), Ule #2321 (FH-G). Although Ule #1754 (BPI) contains ascomycetes of *Melioliphila balanseana* (= *Calonectria balanseana*) on *Meliola*, Rehm's description and illustrations suggest that he was describing *Porina limbulata* which occurs on many of the type specimens. Santesson's synonymy is accepted.

Calonectria fimbriata Seaver & Waterston, Mycologia 32:404. 1940.

= *NECTRIA SYLVANA* Mouton, Bull. Soc. Roy. Bot. Belgique 39:49. 1900.

Type: Bermuda. On dead stems of *Foeniculum vulgare* Gaertn.

The holotype specimen at NY was examined. In agreement with Samuels (1976b), this name is found to be a later synonym of *Nectra sylvana* in the *Nectria peziza*-group as delimited by Booth (1959) and Samuels (1976b). *N. sylvana* and its *Acremonium* anamorph were redescribed and illustrated by Samuels (1976b).

Calonectria flavida (Corda) Sacc., Michelia 1:313. 1878.

= *Sphaeria flavida* Corda, Icon. Fung. 4:40. 1840.

= *Nectria flavida* (Corda) Fries, Summa Veg. Scand. 2: 388. 1849.

= *Lasiosphaeria flavida* (Corda) Cooke, Grevillea 12:112. 1884.

Type: Czechoslovakia. Im Fruhjahre auf modernden Holzspanen der Erle. Sawist bei Prag. 1838.

Booth (1959) stated that there is no type material of this species in existence and erected *Nectria ellisii* to accommodate the specimens from Britain identified as *C. flavida*. He admitted, however, that these specimens do not fit Corda's description. Petch (1938) redescribed *Lasionectria flavida* based on several British collections, some of which were examined by Booth and placed in *Nectria ellisii*, stating that he "accepted Berkeley & Broome's interpretation of Corda's species." I have been unable to locate the holotype specimen.

Calonectria flavida (Corda) Sacc. var. *aurantiorufa* Sacc., Syll. Fung. 2:548. 1883.

Type: Russia. In ramis emortuis Tiflis, (Haussknecht).

Saccardo erected this variety based on Rabenhorst's (1871) misidentification of *Nectria flavida* (Corda) Fries, citing Rabenhorst's description and specimen. The holotype specimen has not been located.

[*Calonectria flavida* Masee ex Petch, Ann. Roy. Bot. Gard. Peradeniya 7:117. 1920. *nom. nud.*]

= *NECTRIA RIGIDIUSCULA* Berk. & Br., J. Linn. Soc., Bot. 14:116. 1873.

Specimen cited: West Indies. Grenada, on bark of *Theobroma cacao*.

In listing the specimens examined of *Calonectria rigidiuscula*, Petch inadvertently published Masee's herbarium name. This is a *nomen nudum* as well as a later homonym of *C. flavida* (Corda) Sacc., 1878. Masee's unpublished name has been listed by Weese (1924), Wollenweber & Reinking (1935) and Booth (1971) as a synonym of *C. rigidiuscula*. Indeed, Masee's specimen with this name (NY) is *Nectria rigidiuscula* ($\equiv$ *C. rigidiuscula*).

Calonectria flavitecta (Berk. & Curt.) Sacc., *Michelia* 1:308. 1878.

$\equiv$ *Nectria aurigera* Berk. & Rav. var. *flavitecta* Berk. & Curt., *Grevillea* 4:46. 1875.

= *HERPOTRICHIA MUTABILIS* (Pers. ex Fries) Winter, Rabenh. Kryptogamen-Fl. Bd. 1 Abt. 2:209. 1887.

Type: United States. South Carolina, on *Kerria japonica*.
Car. Inf. no. 4025.

An isotype specimen (FH-C) was examined. This variety is found to be a later synonym of *Herpotrichia mutabilis*.

Calonectria floridana Sobers, *Phytopathology* 59:366. 1969.

= *CALONECTRIA KYOTENSIS* Terashita, *Trans. Mycol. Soc. Japan* 8:124. 1968.

Type: United States. Georgia, Tifton, *E. radibus Pruni persicae* L. isolatum.

Isotype specimens at BPI and NY have been examined. This name is considered a synonym of *Calonectria kyotensis* which has a *Cylindrocladium* anamorph.

Calonectria frullaniae Racovitza, *Mem. Mus. Natl. Hist. Nat., Ser. B., Bot.* 10:91. 1959.

Type: Rumania. Distr. Cambovita, parasiticum ad sporogonia juniora *Frullaniae dilatatae* (L.) Dum., ad truncos Quercos, in silva prope "Badulesti", 16 VIII 1944, A. Racovitza.

The type specimen has not been located. Döbbeler (1978) included this species in *Calonectria* based solely on Racovitza's publication. From the description and illustrations, this species does not seem to belong to *Calonectria* as defined by Rossman (1979).

Calonectria fuckelii (Nits. ex Fuckel) Sacc., *Michelia* 1:310. 1878.

$\equiv$ *NECTRIELLA FUECKELII* Nits. ex Fuckel, *Jahrb. Nassauischen Vereins Naturk.* 23-24:176. 1870.

Type: Austria. Auf den Rheinauen, an faulem, aber noch hartem Holz von *Populus nigra*, sehr selten, im Herbst.

Specimens of Herbar Barbey-Boissier #915 (BPI, FH-G), issued as *Calonectria fuckelii* are labelled Herbar Fuckel

#1894 and have collection data identical to those in the type description. These are considered type specimens; the one at FH-G is here designated the LECTOTYPE. *Nectriella fuckelii* has light-yellow ascocarps which are partially immersed in hard, decorticated wood and have a broad, protruding papillae. Surrounding the papillae is a ring of long, hyaline setae. The unitunicate asci are clavate with a distinct apical ring and the ascospores are one-septate, minutely punctate, 17-22 x 5-7 μ m. Seaver (1909a) lectotypified the genus *Nectriella* Fuckel with *N. fuckelii*. Other species of *Nectriella* occur on dead herbaceous stems and lichens. *Nectriella* species are related by more than the immersed ascocarps; all have clavate, unitunicate asci each with a distinct apical ring.

Calonectria fuckelii (Sacc.) Rehm in Tranz. & Serebrianikow, Mycotheca Rossica #68. 1910 non *C. fuckelii* (Fuckel) Sacc.
 = *Nectria fuckelii* Sacc., Michelia 1:289. 1878.
 = *Nectriella coccinea* Fuckel, Jahrb. Nassauischen Vereins Naturk. 23-24:177. 1870.
 = *NECTRIELLA TINCTA* (Fuckel) R. Sant. in Eriksson, Sv. Bot. Tidskr. 58:235. 1964.

Type: Germany. Auf dem noch lebenden Thallus und den Apothecien von *Hagenia ciliaris*, wie es scheint, sehr selten, im Frühling. Im Jura bei Neuchatel (Morthier). Fungi Rhenani #1836 (unter *Cryptodiscus tinctus*).

In 1866 Fuckel issued Fungi Rhenani #1836 as *Cryptodiscus tinctus* with a species description on the packet label. Later he published the superfluous name *Nectriella coccinea*, citing the same Fungi Rhenani #1836 as the type specimen. When transferring *Nectriella coccinea* to *Nectria*, Saccardo (1878) recognized that a new epithet must be given because *coccinea* was preoccupied in *Nectria*. He, therefore, proposed the epithet *fuckelii* to accommodate this species in *Nectria*. Rehm transferred *N. fuckelii* to *Nectriella*; however, this epithet was already preoccupied in *Calonectria*. Because *Cryptodiscus tinctus* provides the earliest epithet and the species is correctly placed in *Nectriella*, the correct name for this fungus is *Nectriella tinctoria* (= *Calonectria tinctoria*) typified by Fuckel, Fungi Rhenani #1836. Weese (1914c) and Keissler (1930) redescribed this species as *Nectriella coccinea*.

Calonectria fuckelii (Sacc.) Rehm f. *everniae* Rehm in Motouschek, Centralbl. Bakteriöl., 2 Abth. 42:105. 1915.
 = *NECTRIELLA TINCTA* (Fuckel) R. Sant. in Eriksson, Sv. Bot. Tidskr. 58:235. 1964.

Type: Russia. Schebekino prov. Kursk, in thallo *Evernia prunastri* Ach., 15. VII. 1908., leg. Serebrianikow.

Some specimens of Tranzschel & Serebrianikow, Mycotheca rossica fasc. 2, #68 were issued as *Calonectria fuckelii* f. *everniae* (BPI) and others as *C. tinctoria* (Fuckel) Rehm (CUP). The collection data are identical on both labels except that *C. fuckelii* f. *everniae* is "in thallo *Everniae* *Prunastri* Ach."

while *C. tineta* is "in thallo Anaptychia ciliaris Körb." It is conceivable that Rehm may have recognized, after some of the labels were printed, that *C. fuckelii* f. *everniae* was a later name for *C. tineta* and that the lichen was misidentified. An isotype specimen (BPI) was examined and this form is found to be a synonym of *Nectriella tineta* (= *C. tineta*).

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- Calonectria fulvida* (Ellis & Everh.) Berl. & Vogl., Add.
 Saccardo's Syll. Fung. p. 212. 1886.
 = *Nectria fulvida* Ellis & Everh., J. Mycol. 1:140. 1885.
 = *Dialonectria fulvida* (Ellis & Everh.) Ellis & Everh., J. Mycol. 2:136. 1886.
 = *TUBEUFIA CEREAE* (Berk. & Curt.) Hohnel, Akad. Wiss. Wien Sitzungsber. Math.-Naturwiss. Kl., Abt. 1, 128:562. 1919.

Type: United States. New Jersey, Newfield, on bark of decaying oak limb lying on the ground, Oct. 7, 1885.

An isotype specimen (FH-G) reveals this name to be a later synonym of *Tubeufia cerea* (= *Calonectria cerea*) as previously suggested by Seaver (1909a), Booth (1964) and Rossman (1977).

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- Calonectria funicola* (Berk. & Br.) Sacc., Michelia 1:312. 1878.
 = *Sphaeria funicola* Berk. & Br., Ann. Mag. Nat. Hist. ser. 2, 7:188. 1851.
 = *NECTRIA FUNICOLA* (Berk. & Br.) Berk., Outl. Brit. Fung. p. 393. 1860.
 = *Nectriella funicola* (Berk. & Br.) Petch, Naturalist, Hull 1937:281. 1937.
 = *Lasionectria funicola* (Berk. & Br.) Cooke, Grevillea 12:112. 1884.
 = *Calonectria luteofusca* (Crouan & Crouan) Sacc., Michelia 1:317. 1878.
 = *Nectria luteofusca* Crouan & Crouan, Florule du Finistère p. 39. 1867.

Type: England. King's Cliff, on decayed rope, Oct. 1841.

The holotype specimen at K was examined and agrees with descriptions of this species by Petch (1938) and Booth (1959). Booth placed *Nectria funicola* in the *Lasionectria*-group of miscellaneous *Nectria* species with hairs on the ascocarp.

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- Calonectria geralensis* Rehm, Hedwigia 37:198. 1898.
 = *NECTRIA GERALENSIS* (Rehm) Rossman, comb. nov.

Type: Brazil. Ad folia viva Panici. Serra Geral 1/1891. Ule no. 1765. H. B.

Isotype specimens were examined from S and FH-H; the specimen at S containing Rehm's notes is in excellent condition and is here designated the LECTOTYPE. *Nectria geralensis* belongs to the *Nectria arenula*-group as delimited by Booth (1959) and Samuels (1978). The superficial, yellow-brown ascocarps occur singly in grass leaves, sometimes surrounded by a thin, hyphal stroma. The clavate asci with

undifferentiated apices contain long, fusiform ascospores which are 9- to 11-septate, $48-63 \times 2.5-4 \mu\text{m}$. Additional specimens were issued as *E. Ule*, *Mycotheca Brasiliensis* #70 (B, BPI, C, CUP, FH-H, NY, PACA, PREM, S).

Calonectria gigaspora Massee, Bull. Misc. Inform. 7:257. 1906.
= *NECTRIA MEGASPORA* Rossman, nom. nov.

Type: West Indies. Trinidad, in channel made by the "borer" in sugar-cane, Hart.

Isotype specimens (K, NY) were examined. *Nectria megaspora* is distinctive having some of the largest ascospores in the Hypocreales, $90-160 \times 20-25 \mu\text{m}$, 3-septate. The solitary, superficial, red-orange ascocarps are also large, $1000-1050 \mu\text{m}$ tall and obpyriform with a broadly-rounded papillae. The asci are apparently evanescent at maturity. The affinities of this species within *Nectria* could not be determined. The epithet of the basionym is preoccupied in *Nectria* by *N. gigaspora* P. Henn.

Calonectria gigaspora Weese, Ann. Mycol. 9:424. 1911, non *C. gigaspora* Massee, 1906.

= *Calonectria macrospora* (P. Henn. & E. Nym.) Weese, Ann. Mycol. 8:467. 1910, non *C. macrospora* Sacc. & Speg., 1878 vel *C. macrospora* Rick, 1906.

= *Nectria macrospora* P. Henn. & E. Nym. in O. Warburg, Monsunia 1:161. 1899, non *N. macrospora* Starb., Jan. 1899.

= *NECTRIA JACTATA* Rossm., Mycotaxon 8:527. 1979.

See *Calonectria macrospora* (P. Henn. & E. Nym.) Weese for an account of this species.

Calonectria graminicola (Berk. & Br.) Wollenw., Phytopathology 3:34. 1913.

= *Nectria graminicola* Berk. & Br., Ann. Mag. Nat. Hist. ser. 3, 3:376. 1859.

= *Nectriella graminicola* (Berk. & Br.) Niessl. in Rabenh., Fung. Europ. #1652. 1873.

= *Dialonectria graminicola* (Berk. & Br.) Cooke, Grevillea 12:110. 1884.

= *NECTRIA ARENULA* (Berk. & Br.) Berk., Outl. Brit. Fung. p. 394. 1860.

Type: England. Batheaston, on *Aira caespitosa*, Jan. 1850, C. E. B., Brit. Fungi #897.

Booth (1959) listed this species as incompletely known because the type collections are sparse. He stated that the few remaining ascocarps resemble *Nectria arenula* and that this name is either a synonym of *N. arenula* or a nomen dubium. Krieger, Fungi Saxonici #1424 (CUP), issued as *Nectria graminicola* is *Nectria arenula*. *Calonectria graminicola* was considered by Ihssen (1910) and Wollenweber (1913) to be the perfect state of *Fusarium nivale* (Fries) Ces., a snow mould and cause of a disease of grasses and cereals. The perfect state of *Fusarium nivale* is *Monographella nivalis* (= *Calonectria nivalis*) as explained by Muller (1977).

Calonectria graminicola var. *neglecta* Krampe, Angew. Bot. 8: 252. 1926.

Type: Switzerland. In culmo inferiore Tritici vulgaris, legit Appel. coll. O. Krampe, 1924.

The holotype specimen is not in B and could not be located. An 'authentic' specimen, probably the type specimen, is illustrated by Wollenweber (1916). The superficial ascocarps have a prominent apical disk and what appears to be a *Cylindrocarpon* anamorph. The illustration suggests a fungus in the *Nectria mammoidea*-group as delimited by Booth (1959) but without a type specimen this variety cannot be adequately characterized.

Calonectria graminicola Stevens, Bot. Gaz. 45:232. 1918, non *C. graminicola* (Berk. & Br.) Wollenw., 1913.
= *Melioliphila graminicola* Speg. [ut '(Stevens) Speg.'], Bol. Acad. Nac. Ci. 26:344. 1924.
= *MELIOLIPHILA VOLUTELLA* (Berk. & Br.) Rossm., Mycotaxon 8:551. 1979.

Type: Puerto Rico. On *Meliola panici* Earle on *Lasiacis compacta*, 4663 (type), Utuado; on *Lasiacis divaricata*, 4298, Manati 6796, Arecibo. On *Meliola andirae* E. on *Andira jamaicensis*, 5269, Manati.

Calonectria graminicola Stevens is the monotype species of *Melioliphila* Speg., 1924. (See *Calonectria ambigua*.) Isotype specimens of Stevens 4663 (CUP, NY) and paratype specimens of Stevens 5269 (BPI, CUP, FH-G, NY) were examined. The isotype at CUP is here designated the LECTOTYPE. This species is found to be a later synonym of *Melioliphila volutella* (= *Calonectria volutella*), as is Sydow, Fungi Venezuelani #260a (BPI, PREM) issued as *C. graminicola* Stev.

Calonectria granulosa Seaver, Mem. New York Bot. Gard. 6:508. 1916.
= *NECTRIA HAEMATOCOCCA* Berk. & Br., J. Linn. Soc., Bot. 14:116. 1873.

Type: Bermuda. Near Harrington Sound, on dead stems of *Jasminum*.

The holotype specimen (NY) was examined and reveals this species to be a later synonym of *Nectria haematococca*.

Calonectria guaranitica Speg., Anales Soc. Ci. Argent. 19:42. 1885.
= *Broomella guaranitica* (Speg.) Roum., Rev. Mycol. (Paris) 9:150. 1887.
= *ALLONECTELLA GUARANITICA* (Speg.) Rossman, comb. nov.

Type: Brazil. Ad folia viva *Bambusaceae* cujusdam in uliginosis sylvae Naranjo, 24 Maj. 1883 (sub num. 3828).

The holotype specimen (LPS) was examined. Isotype specimens were issued in Balansa, Champignons du Paraguay #247 (NY) and Roumeguere, Fungi Selecti exs. #4144 (BPI, NY) as

Broomella guaranitica. This species has dark-red ascocarps aggregated on the carbonous stroma of *Phyllachora*. The unitunicate asci are clavate, each with an undifferentiated apex, and the ellipsoid ascospores are 28-35 x 8-9 μ m, three-septate. This species is similar to *Allonectella rubescens* Petrak, 1950, the monotype species of *Allonectella*. The type specimen of *A. rubescens* is not available for study but from Petrak's detailed description *Allonectella* seems to be hypocreaceous. *Broomella* has been reviewed recently and belongs in the Amphisphaeriaceae (Shoemaker & Muller, 1963).

Calonectria guarapiensis Speg., Anales Soc. Ci Argent. 19:41. Jan. 1885.

= *NECTRIA MICROLEUCA* Rossman, nom. nov.

= *Calonectria inconspicua* Winter, Rev. Mycol. (Paris) 7:207. 1 Oct. 1885.

= *Calonectria leucophaës* Rehm, Hedwigia 37:195. 1898.

= *Nectria bakeri* Rehm, Ann. Mycol. 6:319. 1908.

Type: Brazil. Ad folia viva v. languida Sapindaceae species in sylvis prope Guarapi, Jul. 1883 (sub num. 3781).

The holotype specimen (LPS) was examined and reveals this species to be an earlier synonym of *Nectria bakeri*, a species which was redescribed and illustrated by Samuels (1976a). This species occurs on *Meliola* and belongs in the *Nectria leucorrhodina*-group as delimited by Samuels (1976a). The epithet of the basionym of *N. microleuca* is preoccupied in *Nectria* by *N. guarapiensis* Speg., 1885. Rehm, Ascomyceten #1379, issued as *C. guarapiensis* is *Nectria leucorrhodina* (= *Calonectria leucorrhodina*) (B, BPI, BR, CUP, S). Roumeguère, Fungi selecti exs. #4047, issued as *C. guarapiensis*, is *Melioliphila balansea* (= *Calonectria balansea*) (NY).

Calonectria gyalectoidea Rehm, Hedwigia 37:197. 1898.

= *MELIOLIPHILA BALANSEA* (Berl. & Roum.) Piroz., Kew Bull. 31:596. 1976.

Type: Brazil. Oberseite der Blätter einer Sapindaceae. Ule no. 1196 A a. H. B.

The holotype (S) and isotype specimens (FH-G, FH-H) were examined. This name is found to be a later synonym of *Melioliphila balansea* (= *C. balansea*). Weese (1914b) suggested the synonymy of *C. gyalectoidea* with *C. balansea*. Rick, Fungi Austro-americanae #321 (BPI, FH-G, S) issued as *C. gyalectoides* [sic] is *Nectria leucorrhodina* (= *C. leucorrhodina*).

Calonectria gymnosporangii Jaap, Ann. Mycol. 14:10. 1916.

= *NECTRIA GYMNOSPORANGII* (Jaap) Rossman, comb. nov.

Type: Yugoslavia. Dalmatians, auf *Gymnosporangium confusum* Plowr. an Zweigen von *Juniperus phoenicea* L. und *J. oxycedrus* L. mit dem Konidienpilz *Fusarium gymnosporangii* Jaap n. sp. auf der Halbinsel Lapad bei Ragusa, 27. 3. 1914. Vgl. Fungi sel. exs. n. 750!

The holotype (HBG) and an isotype specimen (CUP-F Otto Jaap, Fungi selecti exs. #750 issued as *Fusarium gymnosporangii* Jaap) were examined. This species is found to be a *Nectria* with multiseptate ascospores belonging in the *Nectria coccinea*-group as delimited by Booth (1959). Weese (1924) suggested that *C. gymnosporangii* was related to *Nectria punicea* and *N. galligena* both in the *Nectria coccinea*-group. On the holotype specimen there is an associated *Cylindrocarpon* anamorph which Jaap called *Fusarium gymnosporangii*. Wollenweber & Reinking (1935) transferred the anamorph to *Bactridium*.

CALONECTRIA HEDERAE Arnaud ex Booth & Murray, Trans. Brit. Mycol. Soc. 43:70. 1960.

[= *Calonectria hederæ* Arnaud, Bull. Soc. Mycol. France 68:214. 1952, nom. nud.]

Type: England. Farnham, Surrey, habitat in foliis ad ramis *Hederæ helicis*, J. S. Murray, 6 Nov. 1958. (Herb. IMI 75300).

The holotype specimen (IMI) was examined. *C. hederæ* is related to *C. pyrochroa* (= *C. daldiniana*, the monotype species of *Calonectria*) (Rossman, 1979), having a *Cylindrocladium* anamorph. *C. hederæ* is redescribed and illustrated by Terashita (1969), Matsushima (1971) and Peerally (1974c). Booth & Murray (1960) attribute this species to Arnaud (1952) whose name was invalidly published due to the lack of a Latin diagnosis. Booth & Murray did not choose Arnaud's specimen as the type, perhaps because it was unavailable.

Calonectria hederiseda Rolland & Fautrey, Rev. Mycol. (Paris) 16:73. 1894.

Type: France. Cote-d'OR, sur bois denude de *Hedera helix*, juillet, 1893. (F. Fautrey.)

The holotype specimen is not at PC and has not been located.

Calonectria helminthicola (Berk. & Br.) Sacc., Michelia 1:315. 1878.

= *Nectria helminthicola* Berk. & Br., Ann. Mag. Nat. Hist., ser. 3, 3:375. 1859.

= *LETENDRAEA HELMINTHICOLA* (Berk. & Br.) Weese ex Petch, Trans. Brit. Mycol. Soc. 21:277. 1938.

Type: England. Parasitic on some large species of *Helminthosporium*. Batheaston, Jan. 1859. C. E. B.

The holotype specimen (K) has been examined. In addition, isotype specimens were issued as *Nectria helminthicola*, Rabenhorst, Fungi Europ. #47 (BR, FH-H) labelled "Batheaston, ad ramos Ulmi campestris, Jan. 1859 leg. C. E. Broome." Weese (1914d) stated that *N. helminthicola* belonged in *Letendraea* but did not make the combination. Petch (1938) was the first author to use the combination *Letendraea helminthicola*. *L. helminthicola* (= *L. eurotioides*, the monotype species of *Letendraea* Sacc.) has fleshy, white ascocarps, bitunicate asci and pale-brown, one-septate ascospores. This species is related to *Tubeufia* which generally occurs with dematiaceous fungi on

rotting wood. Muller & von Arx (1962) and Samuels (1973) redescribe, illustrate and list the synonyms of *L. helminthicola*.

Calonectria hendrickxii (Hansf.) Rossm., Mycologia 69:364. 1977.

= *Ophionectria hendrickxii* Hansf., Sydowia Beih. 2:122. 1957.

= *SACCARDOMYCES SOCIUS* P. Henn., Hedwigia 43:353. 1904.

= *Tubeufia asclepiadis* Batista & Garnier, Mem. Soc. Brot. 14:67. 1961.

Type: Zaire. In plagulis *Englerulae macarangae* in foliis *Macaranga* spec., Mt. Biega, Kivu, Hendrickx 3499.

The holotype specimen (IMI) was examined. This species is not hypocreaceous, but belongs in the Sphaeriaceae. There has been some confusion concerning the complex of genera with species which are hyperparasitic or occur directly on living leaves and have small, fleshy ascocarps, unitunicate asci and elongate ascospores. Rather than adding another unfounded opinion, I have chosen to ignore the recent literature on such genera as *Pseudomeliola*, *Schweinitzia*, *Hyalosphaera* and *Saccardomyces* (Petrak & Sydow, 1936; von Arx, 1958; Pirozynski, 1976). I have studied an isotype specimen (FH-G) of *Saccardomyces socius*, the type species of *Saccardomyces*. (Type: Peru. Rio Amazonas, Leticia: Auf Blattern von Solanum, mit Dimerium Saccardoanum, Asterina etc. Juli 1902. No. 3158.) *Calonectria hendrickxii* is a later synonym of *Saccardomyces socius*. *Tubeufia asclepiadis* was also found to be a later synonym of *S. socius*. The holotype specimen (URM) was examined. (Type: Brazil. In foliis *Asclepiadis curassavicae*, Tamatimir, Victoriae, Pern., Leg. Oswaldo Soares, 28.8.959, Typus, 19054, IMUR. Hyperparasitans *Parasterinam laxiusculam* (Syd.) Bat. & Maia et so. iniens cum *Helminthosporio glabroide* F. L. Stevens et *Trichococco ugandensi* Bat. & Maia.) Contrary to reports of von Arx (1958) and Pirozynski (1976), the ascocarp walls of *Saccardomyces socius* are not deliquescent at maturity.

Calonectria hibiscicola P. Henn., Hedwigia 48:105. 1908.

= *NECTRIA RIGIDIUSCULA* Berk. & Br., J. Linn. Soc., Bot. 14:116. 1873.

Type: Paraguay. Hort. botan. Goeldi in corticibus *Hibisci schizopetali*. Jan. 1908 (Baker n. 216.)

An isotype specimen (FH-G) was examined. Although the asci are eight-spored, *Calonectria hibiscicola* is a later synonym of *Nectria rigidiuscula* (= *Calonectria rigidiuscula*). According to Booth (1971), heterothallic strains of *C. rigidiuscula* may be 2- to 8-spored. As is often the case, *Nectria haematococca* Berk. & Br. occurs with *N. rigidiuscula* on the isotype specimen (FH-G) of *C. hibiscicola*. Weese (1914b, 1924, 1927) remarked on the synonymy of *C. hibiscicola* with *Nectria bulbophylli* P. Henn., *C. meliae*, *C. rigidiuscula* and *C. sulcata*. He examined a type specimen of *C. hibiscicola* at B which apparently no longer exists. The isotype specimen at FH-G is here designated the LECTOTYPE.

Calonectria hippocastani (Otth) Sacc., Hedwigia 35:33. 1896.
 = *Nectria hippocastani* Otth, Mitth. Naturf. Ges. Bern
 1868:57. 1868.

Type: Switzerland. Bern, an abgestorbene Zweigen von *Aesculus Hippocastanum*, im Herbst.

An isotype specimen (FH-G) labelled "Original ex Herb. Otth" was examined. The only fungus present was *Nitschkea cupularis* (Pers. ex Fries) Karsten which does not fit Otth's description. Until a suitable type specimen is found, this species cannot be adequately characterized.

Calonectria hirsutellae Petch, Trans. Brit. Mycol. Soc. 21:
 49. 1938.

Type: United States. North Carolina, Cranberry, on a leaf-hopper, coll. Thaxter, August 1887, No. 6153.

The holotype (K) and an isotype specimen (FH-G) were examined. This species is a member of the Clavicipitales, unrelated to *Calonectria* in the Hypocreales. Like "*Calonectria*" *pruinosa*, no suitable genus could be determined for it. The ascocarps are pyriform with smooth, rubbery walls, appearing shiny, composed of small, thin-walled cells, typical of members of the Clavicipitales, and are partially immersed in a byssoid stroma covering the leaf hopper. The asci are unitunicate, each having a cap-like, hemisphaerical apical thickening when young but the apex appearing only slightly thickened at maturity. The ascospores are hyaline, long-ellipsoid and multiseptate but not filiform and not separating into part-spores. This species resembles members of *Torrubiella*, *Byssostilbe* and *Barya* but lacks the capitate asci and long, filiform ascospores. Of these genera only *Torrubiella* is entomogenous. "*Calonectria*" *hirsutellae* is considered by Petch (1938) to be the ascigerous state of *Hirsutella floccosa* Spegare.

Calonectria hirta (Bloxam) Sacc., Michelia 1:307. 1878.
 = *NECTRIA HIRTA* Bloxam in Currey, Trans. Linn. Soc.
 London 24:158. 1863, non *N. hirta* Dobb. & Poelt, 1978.
 = *Trichonectria hirta* (Bloxam) Petch, Naturalist, Hull
 1937:282. 1937.
 = *Lasionectria hirta* (Bloxam) Cooke, Grevillea 12:112.
 1884.

Type: England. Twycross, Leicestershire, on decaying rails.
 Rev. A. Bloxam.

Isotype specimens (K) were examined. Occurring on well-rotted bark, the pale-yellow ascocarps are superficial, solitary, covered with hyaline setae and seated on a thin, hyphal subiculum. The unitunicate asci contain long-ellipsoid, multiseptate ascospores. The type specimen of *Trichonectria aculeata* (= *Calonectria aculeata*), monotype species of *Trichonectria*, has nothing on it that resembles Kirschstein's species. *T. aculeata* and *T. hirta* are similar in description but until a good type specimen of *T. aculeata* is discovered or the species is neotypified, *Trichonectria* cannot be characterized.

- Calonectria höhneliana* Jaap, Ann. Mycol. 14:10. 1916.
 = *PORINA HÖHNELIANA* (Jaap) R. Sant., Symb. Bot. Upsal.
 12:262. 1952.
 = *Phylloporina höhneliana* (Jaap) A. Zahlbr., Oesterr.
 Bot. Z. 68:75. 1919.

Type: Yugoslavia. Dalmatians, auf noch lebenden Cladodien
 und Stengeln von *Ruscus aculeatus* L., bei Castelnuovo, 27.
 4. 1914.

I have examined an isotype specimen (HBG). Santesson
 (1952) examined another isotype (W) listing it as 'holotype?'.
 The specimen at W is designated the LECTOTYPE. The placement
 of this species in the lichen genus *Porina* by Santesson (1952)
 is accepted.

- Calonectria höhnelii* Rehm in Höhnel, Ann. Mycol. 2:43. 1904.
 = "*Calonectria*" *rubropunctata* Rehm, Ann. Mycol. 7:539. 1909.

Type: Brazil. Rio de Janeiro, in pagina inferiore foliorum
Psidii sp. prope Petropolim, mense Augusto 1899, legit de
 Höhnel.

The holotype specimen (S) and an isotype (FH-H) were
 examined; the latter is in better condition. As Weese (1924)
 recognized, "*Calonectria*" *rubropunctata* is a synonym of *C. höh-*
nelii. The dark-red, fleshy ascocarps occur superficially on
 living leaves, loosely surrounded by hyphae which are encrusted
 with rose-red granules. The bitunicate asci contain narrowly-
 clavate, three-septate ascospores. "*Calonectria*" *höhnelii* re-
 sembles *Podonectria gahnii* Dingley in having dark-red, thin-
 walled ascocarps and reddish, granulate hyphae but "*C.*" *höh-*
nelii lacks a well-developed stroma and does not occur on
 scale insects. Although "*C.*" *höhnelii* is a member of the hypo-
 creoid Pleosporales, none of the genera currently recognized
 in that group can accommodate this species (Pirozynski, 1976).

- Calonectria ignota* Chardon, Scientific Survey of Porto Rico
 & Virgin Islands 8:41. 1926.
 = *NECTRIA CALAMI* (P. Henn. & E. Nym.) Rossm., Mycotaxon
 8:494. 1979.

Type: Puerto Rico. Rio Piedras, on dead wood. Herbarium
 Insular Experiment Station (Stevenson & Rosa) No. 6499, June
 18, 1917.

The holotype specimen and an apparent isotype, both at
 BPI, were examined. This name is found to be a synonym of
Nectria calami (= *Calonectria calami*).

- CALONECTRIA ILICICOLA* Boedijn & Reitsma, Reinwardtia 1:58.
 1950.

Type: Java. This perfect state developed in cultures of
Cylindrocladium ilicicola (Hawley), isolated from potato
 tubers by Boedijn and Reitsma, Bogor, February 1948. Type
 culture B. R. 9/49 deposited in the collection of the "Central
 Bureau voor Schimmelcultures," Baarn, Netherlands.

The holotype specimen has not been examined but from the description and *Cylindrocladium* anamorph, this species seems to be related to *Calonectria pyrochroa* (= *C. daldiniana*, the monotype species of *Calonectria*) (Rossman, 1979).

Calonectria inconspicua Winter, Rev. Mycol. (Paris) 7:207. 1885.

= *NECTRIA MICROLEUCA* Rossm., Mycotaxon 8:515. 1979.

Type: Paraguay. Ad folia viva plantae ignotae in *Meliola parasitans*, leg. Balansa.

An isotype specimen (FH-H) 'ex Herb. Winter (Herb. Berlin)' was examined. The specimen in B apparently no longer exists and the isotype at FH-H is designated the LECTOTYPE. *Calonectria inconspicua* is a synonym of *Nectria microleuca* (= *Calonectria guarapiensis*). Sydow, Fungi Venezuelani #239b issued as *C. inconspicua* (S) is *Nectria leucorrhodina* (= *C. leucorrhodina*) while #47 (BPI, S) and #233 (S) are *Nectria pipericola* P. Henn.

CALONECTRIA INDUSIATA Seaver [ut *Nectria*], Mycologia 20:58. 1929.

Type: Trinidad. Morne Bleu, on a fallen leaf of *Micropolis* sp., March 13, 1921 (Seaver 3176).

Although published as a species of *Nectria*, this was an error in printing. The author clearly intended to publish this species as a *Calonectria*. The published illustrations and type specimen are labelled *Calonectria*. Seaver (1909a, 1916) placed all multiseptate-spored *Nectria* species in *Calonectria*. The holotype specimen (NY) was examined. *Calonectria indusiata* is related to *Calonectria pyrochroa* (= *C. daldiniana*, the monotype species of *Calonectria*) (Rossman, 1979).

Calonectria intermixta P. Henn., Hedwigia 41:6. 1902.

Type: Brazil. St. Catharin. bei Blumenau auf berindeten Zweigen mit *Eriosphaeria* sowie mit unreifen Fruchtkörpern einer *Ophioceras*? untermischt. Juli 1892. No. 687b.

A fragmentary isotype specimen (FH-H) had no suitable fungus on it. No other type specimen has been located.

Calonectria jasmini Hansf., Proc. Linn. Soc. Lond. 157:190. 1946.

Type: Uganda. Entebbe Road, in foliis *Jasmini dichotomi*, Hansford 3114.

Isotype specimens (BPI, IMI, PREM) were examined. This species is distinctive having translucent, pale-yellow ascocarps, covered with large, deltoid fascicles of hairs, bitunicate asci and clavate, seven-septate ascospores which lack appendages. Although the ascospores are considerably shorter, "*Calonectria*" *jasmini* is related to the pleosporaceous "*Ophionectria*" species on rusts reported by Rossman (1977). At present, a generic disposition for these members of the hypocreoid Pleosporales is unknown.

Calonectria javanica (Penz. & Sacc.) Höhnelt, Sitzungsber. Kaiserl. Akad. Wiss., Math.-Naturwiss. Cl., Abt. 1, 118: 1180. 1909.

= *CRYPTOTHECIUM JAVANICUM* Penz. & Sacc., Malpighia 1: 388. 1897.

[= *Byssonectria javanica* (Penz. & Sacc.) Höhnelt, Sitzungsber. Kaiserl. Akad. Wiss., Math.-Naturwiss. Cl., Abt. 1, 118:1180. 1909, nom. prov.]

Type: Java. Tjibodas, in foliis putrescentibus Elettariae, 4. III. 97 (195, 366).

An isotype specimen (PAD) labelled #366 was examined; a fragmentary isotype (FH-H) had no suitable fungus on it. This species has small, subglobose ascocarps immersed in a byssoid stroma composed of spinulose, dichotomously-branched hyphae which are encrusted with bright-yellow granules. Although resembling some *Nectria* species, *Cryptothecium javanicum* is retained in this monotypic genus because of the distinctive hyphae of the stroma. The genus *Byssonectria* is based on a discomycete (Korf, 1971).

Calonectroa jimenezii Pat., Bull. Soc. Mycol. France 38:83. 1922.

= *NECTRIA PIPERICOLA* P. Henn., Hedwigia 43:244. 1904.

Type: Costa Rica. Sur le mycélium de *Meliola malchotricha* Speg. des feuilles de *Dichondra repens*, à San Francisco de Guadalupe, en décembre (O. Jimenes).

The holotype specimen (FH-P) was examined. This name is found to be a later synonym of *Nectria pipericola*, a species in the *Nectria leucorrhodina*-group, which has been re-described and illustrated by Samuels (1976a).

Calonectria jungermanniarum (Crouan & Crouan) Sacc., Michelia 1:313. 1878.

= *Nectria jungermanniarum* Crouan & Crouan, Florule du Finistère p. 37. 1867.

= *PSEUDONECTRIA JUNGERMANNIARUM* (Crouan & Crouan) Döbbs., Mitt. Bot. Staatssamml. München 14:98. 1978.

= *Lasionectria jungermanniarum* (Crouan & Crouan) Cooke [ut '*jungermanniae*'], Grevillea 12:112. 1884.

Type: France. Finistère, sur le *Frullania tamarisci* et sur le *Lophocolea bidentata*. Aut. Pr. r.

The lectotype specimen (CO) was examined. I concur with the placement of this species in *Pseudonectria* by Döbbseler (1978) who lectotypified, re-described and illustrated this species.

Calonectria kampalensis Hansf., Proc. Linn. Soc. Lond. 153: 34. 1941.

= *NECTRIA CALAMI* (P. Henn. & E. Nym.) Rossm., Mycotaxon 8:494. 1979.

Type: Uganda. Kampala, in foliis emortuis humidis *Musae sapientium*, Hansford 1887.

The holotype specimen (K) was examined. This name is found to be a later synonym of *Nectria calami* (= *Calonectria calami*).

Calonectria kurdica Petrak, Sydowia 13:95. 1959.

Type: Iran. Auf abgestorbenen Stammchen und dickeren Ästchen von *Astragalus* spec. Kurdistan: Qandil-Gebirge zwischen dem kleinem und grossen Zab, 2800 m, 31. VII. 1957. leg. K. H. Reehinger.

Petrak's specimens (W) are not yet available for examination.

CALONECTRIA KYOTENSIS Terashita, Trans. Mycol. Soc. Japan 8:124. 1 Jan. 1968.

= *Calonectria floridana* Sobers, Phytopathology 59:366. 1969.

= *Calonectria uniseptata* Gerlach, Phytopath. Z. 61:379. April 1968.

Type: Japan. On the leaflet of *Robinia pseudoacacia*, Sep., 1963, Kansai Reg. For. Exp. Sta., Momoyama, Kyoto, leg. Terashita (Type); on the leaves of *Acacia dealbata*, Jan., 1964, at the same locality, leg. Terashita; on *A. dealbata* Mar., 1965, Matsuo National Forest, Kyoto, leg. Terashita. (IFO H'No. 11597 for Holotype and IFO No. 8962 for the tube culture).

Dried cultures and slides "ex Type Coll." (IMI) were examined. This species has a *Cylindrocladium* anamorph and is related to *Calonectria pyrochroa*, (= *C. daldiniana*, the monotype species of *Calonectria*) (Rossman, 1979). Peerally (1974a) redescribed and illustrated *C. kyotensis*.

Calonectria lacustris Kirschst., Ann. Mycol. 34:186. 1936.

= *NECTRIELLA SCEPTRI* (Karst.) Rossm., Mycotaxon 8:542. 1979.

Type: Germany. Auf trockenen noch stehenden Blättern von *Typha latifolia* behnitzer See, Westhavelland. 5. 11. 35.

The holotype specimen (B) as well as an authentic collection (B) labelled '*sp. n.*' and dated '4. 11. 35' were examined. This name is found to be a later synonym of *Nectriella sceptri* (= *Calonectria sceptri*).

Calonectria lagerheimiana Pat., Bull. Herb. Boissier 3:71. 1895.

= *NECTRIA LAGERHEIMIANA* (Pat.) Rossman, *comb. nov.*

Type: Ecuador. Parasite du mycelium de *Meliola*, sur rameaux de *Mimosa Quitensis*. Pululahua.

The holotype specimen (FH-P) was examined and this species is found to belong to the *Nectria leucorrhodina*-group as delimited by Samuels (1976a). *Nectria lagerheimiana* has longer ascospores than any other member of the group.

Calonectria lagerheimii (Pat.) Höhnelt, Ann. Mycol. 17:120. 1919.

= *Broomella lagerheimii* Pat., Bull. Soc. Mycol. France 11:229. 1895.

= *ALLONECTE LAGERHEIMII* (Pat.) H. Syd., Ann. Mycol. 37: 378. 1939.

[= *Puttemansia lagerheimii* (Pat.) Höhnelt, Ann. Mycol. 17:120. 1919, *nom. prov.*]

Type: Ecuador. Feuilles d'une bambusee "moya". San Jorge Juillet.

The holotype specimen (FH-P) has not been examined. This species is described and illustrated by Müller & von Arx (1962) and is retained in the monotypic genus, *Allonecte* H. Syd. Occurring on living leaves, the red-brown ascocarps are covered with long, white hairs and have a basal foot immersed in the leaf, as do some species of *Puttemansia* whose ascocarps are white to pale-yellow. Species of both genera have bitunicate asci and fleshy ascocarps and are related to *Letendraea* and *Tubeufia* in the hypocreoid Pleosporales. Species of *Puttemansia* and *Tubeufia* have elongate, clavate ascospores while those of *Letendraea* and *Allonecte* have ellipsoid, uniseptate ascospores.

Calonectria lanosa (P. Henn.) Weese, Mycol. Centralbl. 4:187. 1914.

= *PUTTEMANSIA LANOSA* P. Henn., Hedwigia 41:112. 1902.

Type: Brazil. São Paulo, Mattos da Serra da Cantareira, auf Blättern einer Lauracee. 26./III. 1901. No. 178.

Isotype specimens (BPI, CUP, FH-H) and an authentic specimen collected '19. 8. 05' (BPI) were examined. The holotype specimen at B apparently no longer exists; the isotype at BPI is here designated the LECTOTYPE. This species is the monotype of *Puttemansia*. The fleshy, pale-yellow ascocarps are densely covered with hairs and are attached to the substrate of living leaves by a basal foot. The bitunicate asci contain clavate, multiseptate ascospores. *Tetracrium* conidia are often associated with the ascocarps suggesting a relationship with *Podonectria*, another member of the hypocreoid Pleosporales (Pirozynski, 1976; Rossman, 1978).

Calonectria leightonii (Berk.) Sacc., Michelia 1:309. 1878.

= *Nectria leightonii* Berk., J. Linn. Soc., Bot. 10:379. 1869.

Type: Cuba (641.) On dead trees. June.

In the original publication, Berkeley listed the type specimen of *Nectria leightonii* as Cuban Fungi #777. He then cited specimens from Europe after the Cuban specimen, noting that "Mr. Leighton's specimens are from Yorkshire, on Larch." Cooke (1873) revised the list of specimens, placing the British specimens first. The Cuban specimen and those from Europe are different and, as Petch (1936) pointed out, only the Cuban collection is considered type material. The holotype (K) and isotype specimens (FH-C, FH-H) were examined. As Seaver (1910)

and Petch (1936) have suggested, this species is a discomycete, probably belonging to the genus *Calycella* (B. Spooner, pers. comm.).

Calonectria leucophaea Rehm, Hedwigia 37:195. 1898.

= *NECTRIA MICROLEUCA* Rossm., Mycotaxon 8:515. 1979.

Type: Brazil. Oberseite der Blätter einer Cordia. Ule no. 924. H. B.

An isotype (FH-H) and two authentic specimens (BPI, FH-H) were examined. This name is found to be a synonym of *Nectria microleuca* (= *Calonectria guarapiensis*) in the *Nectria leucorrhodina*-group as delimited by Samuels (1976a).

Calonectria leucorrhodina (Mont.) Speg., Anales Soc. Ci. Argent. 12:213. 1881.

= *Peziza leucorrhodina* Mont. in Sagra, Hist. Cuba Pl. Cell. p. 360. 1842.

= *NECTRIA LEUCORRHODINA* (Mont.) Samuels, Mem. New York Bot. Gard. 26:90. 1976.

= *Calonectria tubaroensis* Rehm, Hedwigia 37:195. 1898.

= *Calonectria sensitiva* (Rehm) Weese, Ann. Mycol. 8:423. 1910.

= *Nectria sensitiva* Rehm, Hedwigia 39:222. 1900.

= *Calonectria limpida* H. & P. Syd., Leaflet Philipp. Bot. 5:1545. 1912.

= *Calonectria cephalosporii* Hansf., Mycol. Pap. 15:117. 1946.

= *Calonectria ukolayii* Thaug, Trans. Brit. Mycol. Soc. 67:435. 1976.

Type: Cuba. On a leaf, Sagra.

Samuels (1976a) examined the holotype specimen (PC) leaving his notes at NY, which were reviewed. He has redescribed, illustrated and listed the synonyms of *Nectria leucorrhodina*. This species forms the basis of the *N. leucorrhodina*-group as delimited by Samuels (1976a), all the species of which occur on *Meliola*. Synonyms, additional to those listed above, are given by Samuels (1976a).

Calonectria leucorrhodina var. *minor* Speg., Anales Soc. Ci. Argent. 19:40. 1885.

= *NECTRIA PIPERICOLA* P. Henn., Hedwigia 43:244. 1904.

Type: Brazil. Ad folia viva Aurantiaceae cujusdam prope Guarapi, Jul. 1883 (sub num. 3781).

The holotype specimen (LPS) was examined. Isotypes were issued as Roumeguère, Fungi selecti exs. #4142 (BPI, NY). This name is a synonym of *Nectria pipericola* in the *N. leucorrhodina*-group. *N. pipericola* was redescribed and illustrated by Samuels (1976a).

Calonectria levieuxii (Fries) Sacc., Michelia 1:313. 1878.

= *Sphaeria levieuxii* Fries, Elenchus fungorum 2:84. 1828.

= *NECTRIA LEVIEUXII* (Fries) Crouan & Crouan, Florule du Finistère p. 37. 1867.

Type: France. Ad cortices truncorum circa Rothomagus.
Levieux.

Fries (1828) listed this species as "*Sphaeria peziza* var. *levieuxii* in litt." A specimen from UPS labelled *Sphaeria levieuxii* collected in France by Mougéot is considered the holotype. The scarlet, scurfy ascocarps are crowded on a well-developed stroma and become deeply cupulate when dry. The unitunicate, cylindric asci contain ellipsoid, uniseptate ascospores which are 13-15 x 4-5 μ m. *Nectria levieuxii* belongs to the *Nectria coccinea*-group as delimited by Booth (1959).

Calonectria lichenicola (Ces.) Rehm, Ascom. Lojk. p. 44. 1882.
= *Cryptodiscus lichenicola* Ces. in Rabenh., Herb. Mycol. ed. 2, #523. 1857.
= *Nectria lichenicola* (Ces.) Sacc., *Michelia* 1:289. 1878.
= *Nectriella lichenicola* (Ces.) Fuckel ex Höhnelt & Weese, *Ann. Mycol.* 8:466. 1910.
= *Pronectria lichenicola* (Ces.) Clements & Shear, *Genera of Fungi* p. 282. 1931.
= *NECTRIELLA ROBERGEI* (Mont. & Desm.) Weese, *Ann. Mycol.* 8:467. 1910.

Type: Italy. Circa lacusculum montanum di Bertignana alterumque paullo distantem di Viverone ad limited austro-occidentionis Bugellensis (Pedemont.) Oct.-Nov. 1856.

I have not seen any of the type specimens of *Cryptodiscus lichenicola*. Many authors (Winter, 1872; Rehm, 1881; Vouaux, 1912; Weese, 1914c; Keissler, 1930; Müller & von Arx, 1962) have recognized the synonymy of *C. lichenicola* with *Nectriella robergei*.

Calonectria lichenigena Speg., *Bol. Acad. Nac. Ci.* 11:530. 1889.

Type: Argentina. In thallo lichenino quodam ad cortices languidos Apiahy, Jul. 1881 (sine n.).

The holotype specimen (LPS) has white *Tubercularia*-like sporodochia which are erumpent through lichens on bark. There are no ascocarps present; this species cannot be adequately characterized.

Calonectria limpida H. & P. Syd., *Leafl. Philipp. Bot.* 5:1545. 1912.
= *NECTRIA LEUCORRHODINA* (Mont.) Samuels, *Mem. New York Bot. Gard.* 26:90. 1976.

Type: Philippines. Palawan, Brooks Point (Addison Peak), parasitic on the mycelium of an old *Meliola* on the leaves of *Acalypha stipulacea* Klotz., February, 1911, no. 12656.

Isotype specimens were located at BPI, FH-G and IMI. The holotype specimen at B has apparently been destroyed; the isotype at FH-G is here designated the LECTOTYPE. This name is found to be a later synonym of *Nectria leucorrhodina* (= *Calonectria leucorrhodina*). Hansford (1946) placed *Calonectria*

limpida close to *C. cephalosporii*, another synonym of *Nectria leucorrhodina*.

Calonectria longisetosa Hansf., Mycol. Pap. 15:125. 1946.

= *MELIOLIPHILA LONGISETOSA* (Hansf.) Rossman, comb. nov.

Type: Uganda. In plagulis *Meliolae chorleyi* in foliis *Trichiliae*, Hansford no. 2456 (typus); in plagulis *M. spec.*, in foliis *Jaundeae monticolae*, Kawanda Uganda, Hansford no. 2841.

Authentic specimens from Uganda (IMI: Hansford 2999, 3331; PREM: Hansford 3331) were examined; no other type collections were located. This species belongs in *Melioliphila*, having bitunicate asci and fleshy, pale-yellow ascocarps occurring on *Meliola*. Although close to *M. volutella* (= *Calonectria volutella*), the longer ascospores and dense covering of long, flexuous hairs on the ascocarps of *M. longisetosa* make this species distinctive.

Calonectria luteofusca (Crouan & Crouan) Sacc., Michelia 1: 317. 1878.

= *Nectria luteofusca* Crouan & Crouan, Florule du Finistère p. 39. 1867.

= *NECTRIA FUNICOLA* (Berk. & Br.) Berk., Outl. Brit. Fung. p. 393. 1860.

Type: France. Sur une corde pourrie, sur la terre, dans un verger. Hiv. Pr. r. r.

The holotype specimen (CO) was examined. This name is found to be a later synonym of *Nectria funicola* (= *Calonectria funicola*), a species which was redescribed and illustrated by Booth (1959).

Calonectria luteola (Rob. ex Desm.) Sacc., Michelia 1:315. 1878.

= *Sphaeria luteola* Rob. ex Desm., Ann. Sci. Nat. Bot., ser. 3, 16:314. 1851.

= *NECTRIELLA LUTEOLA* (Rob. ex Desm.) Weese, Ann. Mycol. 12:131. 1914.

Type: France. In foliis siccis arborum. Aestate.

The type collection was issued in 1850 without a description as Desmazières, Pl. Crypt. France #2078. Despite the eventually emergent ascocarps, isotype specimens (BPI, FH-C, H, NY) show this species to be allied with *Nectriella*. The smooth, subglobose ascocarps become collabent when dry. The narrowly-clavate asci have a distinct apical ring and the ascospores are ellipsoid, uniseptate, 11-14 x 3-4 µm.

Calonectria macrospora Sacc. & Speg. in Sacc., Michelia 1:251. 1878.

= *MASSARINA VIBURNICOLA* (Crouan & Crouan) Rossman, Mycotaxon 8:550. 1979.

Type: Italy. In cortice emortuo *Vitis viniferae* a Conegliana, Aut. 1876 (Spegazzini).

This species was described in Saccardo's (1878a) article on *Fungi Veneti* Series VIII, covering new and critical species in the exsiccati centuries VIII-XIII. The type collection may be Saccardo, *Mycotheca Veneta* #1275 whose collection data agree with those in the type description except that the exsiccati was collected in Jan. 1878 while the type was said to be collected in "Aut. 1876." The exsiccati specimens are at least authentic and were examined from BPI, BR, FH-H, LPS and NY. Two specimens in FH-H marked "Original" and "Original, ex Herb. Saccardo" are probably type specimens but the labels are insufficient to determine whether either could be part of the holotype collection. These specimens are all identical with the type of *Massarina viburnicola* (= *Calonectria viburnicola*).

Calonectria macrospora Sacc. & Speg. ssp. *tarvisina* Speg., *Michelia* 1:464. 1879.
 = *Calonectria tarvisina* (Speg.) Speg. ex Sacc. (ut 'Speg.'), *Syll. Fung.* 2:540. 1883.
 = *MASSARINA VIBURNICOLA* (Crouan & Crouan) Rossm., *Mycotaxon* 8:550. 1979.
 See *Calonectria tarvisina*.

Calonectria macrospora Rick, *Broteria* 5:41. 1906, non *C. macrospora* Sacc. & Speg., 1878 vel *C. macrospora* (P. Henn. & E. Nym.) Weese, 1910.
 = *Calonectria dolichospora* Sacc. & Trott., *Syll. Fung.* 22:490. 1913.

Type: Brazil. Rio Grande do Sul, in foliis putridis palmarum.

Saccardo & Trotter (1913) legitimized Rick's species by renaming it. I have been unable to locate the type specimen.

Calonectria macrospora (P. Henn. & E. Nym.) Weese in Hühnel & Weese, *Ann. Mycol.* 8:467. 1910, non *C. macrospora* Sacc. & Speg., 1878 vel *C. macrospora* Rick, 1906.
 = *Nectria macrospora* P. Henn. & E. Nym. in O. Warburg, *Monsunia* 1:161. 1899, non *N. macrospora* Starb., Jan. 1899.
 = *Calonectria gigaspora* Weese [ut '(P. Henn.) Weese'] in Hühnel & Weese, *Ann. Mycol.* 9:424. 1911, non *C. gigaspora* Massee, 1906.]
 = *NECTRIA JACTATA* Rossman, nom. nov. [Etymology: Latin, *jactatus*, meaning tossed around.]

Type: Java. Hort. Bogor.: auf abgestorbenen Zweigen. Aug. 1898. (E. Nyman.)

Isotype specimens of *N. macrospora* P. Henn. & E. Nym. were examined from FH-H and S; the latter is here designated the LECTOTYPE. This distinctive species is related to *N. pseudopeziza* (= *Calonectria pseudopeziza*) in ascocarp wall structure; however, *N. jactata* has one-septate, punctate ascospores, 30-38 x 11-17 μ m.

[*Calonectria mangiferae* Sechet, Fruits d'outre mer 8:270. 1953, nom. nud.]

Type: Madagascar. Tananarive, a 1300 m, on *Mangifera indica*.

The type description lacks a Latin diagnosis and is, therefore, not validly published. No specimen under this name has been located.

Calonectria massariae (Pass.) Sacc., Michelia 1:312. 1878.
= *Nectria massariae* Pass. in Rabenh., Fungi Europ.
#1827. 1874.

= *NECTRIA DECORA* (Wallr.) Fuckel, Jahrb. Nassauischen
Vereins Naturk. 23-24:179. 1870.

Type: Italy. Parmae--Giardino pubblico. Parasitans in
Massaria inquinante ad ramulos Aceris campestris. Martio
1874. leg. G. Passerini.

Isotype specimens of this exsiccati number were examined (BPI, BR, FH-H, S). This name is found to be a later synonym of *N. decora* (= *Calonectria decora*) as stated by Weese (1914a), Wollenweber & Reinking (1935) and Pirozynski (1975).

Calonectria meliae A. W. Zimm., Centralbl. Bakteriöl., 2.
Abth. 7:106. 1901

= *NECTRIA RIGIDIUSCULA* Berk. & Br., J. Linn. Soc., Bot.
14:116. 1873.

Type: Java. Buitenzorg, an einem absterbenden Stamme von
Melia arguta.

The type specimen has apparently been destroyed; it is not at B. Höhnelt & Weese (1911) and Weese (1914b, 1924) suggested that *Calonectria meliae* is a synonym of *C. sulcata* (= *N. rigidiuscula*) and later (Weese, 1927) of *C. rigidiuscula* (= *N. rigidiuscula*) as do Wollenweber & Reinking (1935) and Booth (1971). Based on these previous decisions and the type description, I accept *C. meliae* as a synonym of *Nectria rigidiuscula* (= *Calonectria rigidiuscula*).

Calonectria meliolae Hansf., Proc. Linn. Soc. Lond. 153:33.
1941.

= *MELIOLIPHILA BALANSEANA* (Berl. & Roum.) Piroz., Kew
Bull. 31:596. 1976.

Type: Uganda. In plagulas *Meliolae tecleae* in foliis
Techleae nobilis, Kazi, Kampala, Hansford 1909 p. p.

The holotype (K) and authentic specimens (BPI: Hansford 2866, 2874, 3065, 3470; PREM: Hansford 3304) reveal this name to be a synonym of *Melioliphila balanseana* (= *Calonectria balanseana*).

Calonectria melioloides Speg., Anales Soc. Ci. Argent. 19:41. 1885.

= *MELIOLIPHILA MELIOLOIDES* (Speg.) Piroz., Kew Bull. 31:596. 1976.

= *Calonectria melioloides* Speg. f. *macrospora* Rehm, Hedwigia 37:196. 1898.

Type: Brazil. Ad folia viva Myrtaceae cujusdam in sylvis prope Guarapi, Jun. 1881 (sub num. 2744).

Isotype specimens of Balansa, Pl. du Paraguay #2744 were examined at FH-H, FH-P and NY. Roumeguère, Fungi selecti exs. #4141 (BPI) has the same collection data as those cited in the type description. The specimen sent as type from LPS was collected "XI--1883. No. 1674. Leg. Balansa, nro. 4017" and is considered authentic. This species belongs in *Melioliphila* having bitunicate asci, fleshy, pale-yellow ascocarps covered with long, flexuous hyphae and clavate, three-septate ascospores. Weese (1914b, 1927) stated that *Calonectria trichilae* and *C. soroccae* (both = *Melioliphila volutella*) and *C. erysiphoides* (= *M. erysiphoides*) are synonyms of *C. melioloides* (= *M. melioloides*) and that on the basis of ascocarp wall structure these species resemble *C. balanseana* (= *M. balanseana*) and *C. appendiculata* (= *M. appendiculata*). These species, all now placed in *Melioliphila*, are separated on differences in ascocarp ornamentation.

Calonectria melioloides Speg. f. *macrospora* Rehm, Hedwigia 37:196. 1898.

= *MELIOLIPHILA MELIOLOIDES* (Speg.) Piroz., Kew Bull. 31:596. 1976.

Type: Brazil. Feuilles de ?Guarapi, 6/1889. Balansa Pl. du Paraguay no. 2744. H. B.

Rehm (1898) divided *Calonectria melioloides* into two forms: *macrospora* and *microspora*. The typical form must be *macrospora* because the type specimen of form *macrospora* seems to be the same as that of *C. melioloides*. Although both are listed as #2744, the year is listed as "1889" in Rehm's type citation of form *macrospora* and "1881" in Spegazzini's publication of *C. melioloides*.

Calonectria melioloides Speg. f. *microspora* Rehm, Hedwigia 37:196. 1898.

= *MELIOLIPHILA BALANSEANA* (Berl. & Roum.) Piroz., Kew Bull. 31:596. 1976.

Type: Brazil. Feuilles. Guarapi. 7/1883. Balansa pl. du Paraguay no. 3796. H. B.

An isotype specimen (FH-H) shows this form to be a synonym of *Melioliphila balanseana* (= *C. balanseana*) having smooth ascocarps and shorter ascospores than *M. melioloides* (= *C. melioloides*).

Calonectria mellina (Durieu & Mont.) Höhnelt, Ann. Mycol. 8: 467. 1910.

= *Sphaeria mellina* Durieu & Mont., Expl. Sci. Algérie Bot. 1:497. 1849.

= *Nectria mellina* (Durieu & Mont.) Mont. [ut Mont.], Syll. Generum Spec. Plantarum Cryptogam. p. 225. 1856.

= *Ophionectria mellina* (Durieu & Mont.) Sacc. [ut '(Mont.) Sacc.'], Michelia 1:323. 1878.

= *NECTRIA PSEUDOPEZIZA* (Desm.) Rossm., Mycotaxon 8:536. 1979.

Type: Algeria. In ramulo dejecto ad Mustapha prope Alger a Durieu inventa.

The holotype specimen (PC) was examined. This name is found to be a later synonym of *Nectria pseudopeziza* (= *Calonectria pseudopeziza*). Weese (1914b) suggested that *C. mellina* was a synonym of *C. plowrightiana* which I place in synonymy with *N. pseudopeziza*.

Calonectria mindoensis Petrak, Sydowia 2:323. 1948.

Type: Ecuador. Auf faulenden Stämmen einer Bambusee. Prov. Pichincha: Mindo. 15. XI. 1937, Nr. 388/a.

Petrak's specimens (W) are not yet available for study.

Calonectria miniscula Sacc. & Speg. in Sacc., Michelia 1:251. 1878.

= *NECTRIA MINISCULA* (Sacc. & Speg.) Rossmann,

Type: Italy. In foliis subputrescentibus Cryptomeriae japonicae a Susegana. Martio 1877. (Spegazzini).

An isotype specimen (LPS) was examined. Another fragmentary isotype specimen (FH-H) no longer contains any suitable fungus. *Nectria miniscula* is a member of the *Nectria arenula*-group as delimited by Samuels (1978), close to *N. erubescens* (= *Calonectria erubescens*). Unlike *N. erubescens*, ascocarps of *N. miniscula* have a distinct corona of cells surrounding the ostiole.

Calonectria minutissima W. Grove, J. Bot. 68:131. 1930.

Type: England. In culmis emortuis *Heleocharidis palustris*, in paludosis prope Aldridge. Staffs, Septembri.

The holotype specimen has not been located.

Calonectria moravica Petrak, Ann. Mycol. 32:432. 1934.

Type: Czechoslovakia. Moravia. Auf faulenden, feucht liegenden Ästen von *Robinia pseudoacacia*; Mahr-Weisskirchen, Bahndamm bei Teplitz, IV. 1912.

Petrak's specimens (W) are not yet available for study.

Calonectria muscicola Zerova, Bot. Zhurn. (Kiev) 12:106. 1955.

Type: Russia. Kazakhstan-Ukraine, in juga Zilijskij-Alattua, on *Plagiothecium pulchellum* (Hedw.) Br., in saxosis prope lac. Issyk, sparse, 4. IX 1943, leg. A. S. Lasarenko.

The holotype specimen has not been located. Racovitza (1959) stated that this species is related to *Calonectria duplicella* (= *Abseonditella duplicella*), a member of the Ostropales. The type description and geographical distribution suggest that *C. muscicola* may also belong in *Abseonditella*. Döbbeler (1978) included *C. muscicola* in *Calonectria* without examining the type specimen.

Calonectria muscivora (Berk. & Br.) Sacc., *Michelia* 1:315. 1878.

= *Sphaeria muscivora* Berk. & Br., *Ann. Mag. Nat. Hist.*, ser. 2, 7:188. 1851.

= *NECTRIA MUSCIVORA* (Berk. & Br.) Berk., *Outl. Brit. Fung.* p. 394. 1860.

Type: England. King's Cliffe, on mosses upon the mud tops of walls in winter.

The holotype (K) and an isotype specimen (PC) were examined only macroscopically. Samuels (1976a) and Döbbeler (1978) have redescribed, illustrated, discussed and listed the synonyms of *Nectria muscivora*.

Calonectria nivalis Schaffnit, *Mycol. Centralbl.* 2:255. 1913.

= *MONOGRAPHELLA NIVALIS* (Schaffnit) Müller & von Arx, *Rev. Mycol. (Paris)* 41:132. 1977.

= *Griphosphaeria nivalis* (Schaffnit) Müller & von Arx, *Phytopath. Z.* 24:356. 1955.

= *Micronectrella nivalis* (Schaffnit) Booth, *The genus Fusarium* p. 42. 1971.

Type: None designated.

No specimen that Schaffnit examined has been located; however, mycologists have come to an agreement on the concept of this species. Müller (1977) discussed the confusion surrounding the generic placement of *Monographella nivalis* and listed the numerous synonyms. This fungus is known as a snow mould causing a disease of cereals. Until recently thought to be a member of the Hypocreales, *M. nivalis* is quite unlike *Nectria* or *Gibberella* species having *Fusarium* anamorphs. Likewise, Booth (1971) considered the *Fusarium* state of *M. nivalis* to be distinct within *Fusarium*. *Monographella* is now placed in the Physosporrellaceae, Phyllachorales by Barr (1976).

Calonectria novae-zealandica Dingley, *Trans. & Proc. Roy. Soc. New Zealand* 79:404. 1952.

= *NECTRIA NOVAE-ZEALANDICA* (Dingley) Rossman, *comb. nov.*

Type: New Zealand. Hooker moraine, Canterbury, on *Discaria toumatou* Raoul, Feb. 1947.

The holotype specimen (PDD) was examined. *Nectria novae-zealandica* belongs to the *Nectria aquifolii*-group as delimited by Booth (1959), particularly related to *Thyronec-tria pseudotrichia* (Schw.) Seeler, *Nectria canadensis* (= *Calonectria canadensis*) and *Nectria aurigera* (= *C. aurigera*).

Calonectria obtecta Rehm, Hedwigia 39:225. 1900.

= *Trichopeltis obtecta* (Rehm) Rehm, Hedwigia 44:1. 1904.

= *Cryptopeltis obtecta* (Rehm) Rehm, Ann. Mycol. 4:409. 1906.

= *PORINA EPIPHYLLA* (Fee) Fee, Essai Crypt. Suppl. p. 76. 1837.

Type: Brazil. Folium Corymbidis. Ule no. 868b.--Folium filicis. Ule no. 863a.--Folium Myrtaceae. Tubarao. Ule no. 1400a.--Folia Lindsayae. Itajahy. Ule no. 622 (stroma 1 mm). --Folia Liriosomatis. Ule no. 950b.--Folia Calathea. Ule no. 950b. H. Bresl.

Syntype specimens were examined (FH-G: Ule #1400, #622, #863 as 'obtusa'). Ule #622 at FH-G is here designated the LECTOTYPE. Santesson (1952) suggested that all the specimens in the herbarium at Breslau were destroyed. He did not see any type material of *Calonectria obtecta* but examined Rehm, Ascomyceten #1671 (S) issued as *Cryptopeltis obtecta* and agreed with Weese (1924) who synonymized *C. obtecta* with *Porina epiphylla*. After examination of the type specimens at FH-G, I agree with this evaluation.

Calonectria obvoluta (Karst.) Sacc., Michelia 1:316. 1878.

= *Nectria obvoluta* Karst., Bidrag Kännedom Finlands Natur Folk 23:217. 1873.

= *NECTRIELLA OBVOLUTA* (Karst.) Rossman, comb. nov.

Type: Finland. Supra folia *Calamagrostidis arida* mense Octobri prope Mustiala reperta.

The holotype specimen (H) was examined. It is in poor condition but was found to be a *Nectriella*. The pale-yellow ascocarps are immersed initially, becoming superficial at maturity. The clavate asci have an apical ring and the ascospores are fusiform, uniseptate, 8-10 x 1.5-2 μ m.

Calonectria ochraceopallida (Berk. & Br.) Sacc., Atti Accad. Sci. Veneto-Trentino-Istria, Padova 7:23. 1875.

= *Sphaeria ochraceopallida* Berk. & Br., Ann. Mag. Nat. Hist. ser. 2, 7:187. 1851.

= *Nectria ochraceopallida* (Berk. & Br.) Berk., Outl. Brit. Fung. p. 394. 1860.

= *NECTRIA PSEUDOPEZIZA* (Desm.) Rossm., Mycotaxon 8:536. 1979.

Type: England. Rockingham Forest, on elm branches.

The holotype (K), isotype slides (IMI) and authentic specimen (H, ex Herb. Plowright; UPS, ex Herb. Broome) were examined. This name is found to be a later synonym of *Nectria pseudopeziza* (= *Calonectria pseudopeziza*).

Calonectria olivacea Höhnelt, Sitzungsber. Kaiserl. Akad. Wiss., Math.-Naturwiss. Cl., Abt. 1, 116:107. 1907.

Type: Germany. An stark vermorschtem *Fagus*-Holz. Sauerbrunnleiten bei Rekawinkel im Wienerwalde, August 1906.

Only a label without the holotype specimen can be found at FH-H. No type specimen has been located.

Calonectria oodes Petch, Ann. Roy. Bot. Gard. Peradeniya 7: 135. 1920.

= *NECTRIA CALAMI* (P. Henn. & E. Nym.) Rossm., Mycotaxon 8:494. 1979.

Type: Ceylon. On a decaying stem, Peradeniya, June, 1919; No. 6009 in Herb. Peradeniya.

A portion of the type specimen was examined (K). This name is found to be a synonym of *Nectria calami* (= *Calonectria calami*), as recognized by Weese (1927) and Petch (1950).

Calonectria opalina (Crouan & Crouan) Sacc., Michelia 1:311. 1878.

= *NECTRIA OPALINA* Crouan & Crouan, Florule du Finistère p. 39. 1867.

Type: France. Finistère, sur les tiges mortes et submergées de *Cirsium palustre*. Pr. r.

The holotype specimen (CO) was examined. This species belongs in *Nectria* and has white, partially immersed ascomycetes, unitunicate asci and fusiform, multiseptate ascospores.

Calonectria otagensis (Currey ex Lindsay) Sacc., Michelia 1: 308. 1878.

= *NECTRIA OTAGENSIS* Currey ex Lindsay, Trans. Roy. Soc. Edinburgh 24:428. 1867.

Type: New Zealand. Otago. On stockyard fences of old "Goai" timbers, ravines of the Chain Hills.

The holotype (E) and an authentic specimen (E) were examined. This species belongs in *Nectria* and has globose, pale-yellow ascomycetes on a well-developed stroma, unitunicate asci and ellipsoid, uniseptate ascospores, 12-23 x 4-7 μ m. Dingley (1951) redescribed, illustrated and discussed *Nectria otagensis*. Wollenweber & Reinking (1935), followed by Booth (1971), were incorrect in stating that *Calonectria otagensis* is a synonym of *Gibberella baccata* (Wallr.) Sacc.

Calonectria oudemansii (Westend.) Sacc., Michelia 1:308. 1878.

= *Nectria oudemansii* Westend., Bull. Soc. Roy. Bot. Belgique 5:39. 1866.

= *NECTRIA OCHROLEUCA* (Schw.) Berk., Grevillea 4:16. 1875.

Type: Holland. Sur l'écorce des branches et rameaux morts de l'*Urostigma Neumannii* Miq., dan les serres du Jardin botanique, M. J.-A.-C.-A. Oudemans, professeur a l'Athénée illustre d'Amsterdam. Mai. 1864.

Two isotype specimens at BR and one at B were examined. The isotype at BR with Westendorp's notes is here designated the LECTOTYPE. *Nectria oudemansii* is a later synonym of *Nectria ochroleuca*, a species which was redescribed and illustrated by Samuels (1976a).

Calonectria pachythrinx Rehm, Ann. Mycol. 5:531. 1907.

= *TUBEUFIA PACHYTHRINX* (Rehm) Rossman, comb. nov.

Type: Brazil. Ad ramulos Rubi. Sao Francisco dos Campos, Sao Paulo 12. 1896, leg. F. Noack comm. Sydow no. 199.

Isotype specimens (FH-G, S) were examined. The specimen at S is here designated the LECTOTYPE. This species is a *Tubeufia* associated with old pyrenomycetes and dematiaceous hyphae on well-rotted wood. The pale-yellow ascocarps are covered with long, tapering hairs. The asci are bitunicate and the ascospores are long-fusiform, multiseptate, 40-57 x 4-5 μ m. *Tubeufia pachythrinx* is similar in ascocarp structure to *T. paludosa* (Crouan & Crouan) Rossm. (= *T. javanica* Penz. & Sacc., the type species of *Tubeufia*) but unlike the common temperate species, *T. cerea* (= *Calonectria cerea*) and *T. heli-coma* (Phill. & Plowr.) Piroz.

Calonectria pellucida O. Rostrup, Dansk. Bot. Ark. 2:8. 1916.

Type: Denmark. Ad paleas *Dactylidis glomeratae*. S. Gelsskov, Marts 1912.

The holotype specimen is not at C or CP and has not been located.

Calonectria perpusilla Sacc., Atti Accad. Veneto-Trentino-Istrian, Padua ser. 3, 10:69. 1917.

Type: Philippines. In glumis emortuis *Oryzae sativae*, Los Banos, Oct. 1914 (3802). Socium adest *Myrothecium oryzae*, quod cfr. suo loco.

The holotype specimen (PAD) was examined. This species belongs in the Physosporrellaceae, Phyllachorales as reviewed by Barr (1976). The small, dark-brown, fleshy ascocarps are immersed but eventually become superficial with only the base of the ascocarp embedded in the substrate. The unitunicate asci are broadly clavate, each with a refractive apical ring and the ascospores are ellipsoid, with broadly-rounded ends, equally one-septate, 17-19 x 5-6 μ m. An *Arthrinium*-like fungus is associated with the ascocarps as in *Aplospora montagnei* Sacc. However, *A. montagnei* has ascocarps which are surrounded by a well-developed clypeus and the ascospores are unequally one-septate. The solitary ascocarps and medially septate ascospores of "*Calonectria*" *perpusilla* suggest *Monographella* Petrak whose type species, *M. divergens* Petrak (= *M. nivalis*, = *Calonectria nivalis*) has a *Fusarium* anamorph. The generic placement of "*Calonectria*" *perpusilla* could not be determined.

Calonectria phycophora Döbb., Mitt. Bot. Staatssamml. München 14:66. 1978.

Type: New Guinea. Papua, Dist. Northern, Subdist. Kokoda, eastern side of lake Myola No. 1, (9° 10' X, 147° 45' E), submontane rainforest, 2000 m, gemeinsam mit *Bryorella crassitecta* und *Calonectria biseptata*, 23. VII. 1974. J. R. CROFT et al. (LAE 61975), (-), (Holotypus M; Isotypus Dö 2278).

The holotype specimen of this recently described species has not been examined. This species was placed in *Calonectria* solely on the basis of the multiseptate ascospores. From the description and illustration it appears to be unlike *Calonectria pyrochora* (= *C. daldiniana*, the monotype species of *Calonectria*) (Rossmann, 1979), and should be placed with allied species in the genus *Nectria*.

Calonectria pithecoctenii Verissimo d'Almeida & Souza da Camara, Revista Agron. (Lisbon) 3:254. 1905.

Type: Portugal. In ramulis emortuis *Pithecoctenii Squali* DC., in horto botanico Coimbra, leg. A. Moller, octobri, 1904.

COI has not responded to inquiries concerning the type specimen which has not been located.

Calonectria platasea (Berk.) Sacc., Michelia 1:308. 1878.

= *Sphaeria platasea* Berk. in W. J. Hooker, The English Flora 5:263. 1836.

= *Nectria platasea* (Berk.) Berk., Outl. Brit. Fung. p. 393. 1860.

Type: England. On the soft wet decayed stump of a maple which has been broken off. Winter. Rockingham Forest, Norths. Rev. M. J. Berkeley.

Petch (1936) stated that the type specimen of this species is exhausted. Its identity remains in obscurity.

Calonectria plowrightiana Sacc., Michelia 1:307. 1878.

= *NECTRIA PSEUDOPEZIZA* (Desm.) Rossm., Mycotaxon 8:536. 1979.

Type: England. In caule putrescente Lappae, Febr. 1878 (C. B. Plowright).

The type collection of this species was issued as Plowright, Sphaeriacei Britannici cent. III, #15. Isotype specimens (FH-H, H, NY) were examined. This name is found to be a later synonym of *Nectria pseudopeziza* (= *Calonectria pseudopeziza*). Weese (1914b), Petch (1938) and Dingley (1952) suggested that *C. plowrightiana* is a synonym of *C. ochraceopallida* which I place in synonymy with *Nectria pseudopeziza*.

- Calonectria polythalamia* (Berk.) Sacc., *Michelia* 1:308. 1878.
 = *Nectria polythalamia* Berk. in J. D. Hooker, *Flora of New Zealand* 2:203. 1855.
 = *Scolecconectria polythalamia* (Berk.) Seaver, *Mycologia* 1:200. 1909.
 = *THYRONECTRIA PSEUDOTRICHIA* (Schw.) Seeler, J. Arnold Arbor. 21:438. 1940.

Type: New Zealand. On dead bark, Bay of Islands, J. D. H.

The holotype specimen (K) was examined. In agreement with Dingley (1952), I find this name to be a later synonym of *Thyronectria pseudotrichia*. *Scolecconectria polythalamia sensu* Seaver is *Nectria aurigera* (= *Calonectria aurigera*), a name which had previously been thought to be a synonym of *S. polythalamia* (Seaver, 1909a). Ravenel, *Fungi Carolinensis fasc. 3, #54* (BPI, BR, FH-H), issued as *Nectria polythalamia*, is *Nectria aurigera* (= *Calonectria aurigera*).

- Calonectria pruinosa* Petch, *Trans. Brit. Mycol. Soc.* 16:226. 1931.

Type: Ceylon. Nuwara Eliya, on a leafhopper on bamboo (*Arun-dinaria debilis*), etc.

An isotype specimen (K) was examined. Like "*Calonectria*" *hirsutellae*, "*Calonectria*" *pruinosa* belongs in the Clavicipitales; however, no suitable genus for it could be determined. The pale-yellow, conical ascocarps are composed of small, thin-walled cells forming *textura angularis* and are partially embedded in a byssoid stroma which completely covers the insect. The asci are cylindric, each with a capitate apex when immature, but having a narrow canal through the slightly-thickened apex at maturity. Unlike most members of the Clavicipitales, the ascospores are not filiform, but fusiform, 7- to 9-septate, 20-26 x 3-5 μ m. Petch (1931) described the conidial state as *Hirsutella versicolor*. "*Calonectria*" *pruinosa* and "*Calonectria*" *hirsutellae* are related to species of *Byssostilbe*, *Barya* and *Torrubiella*, all of which are characterized by filiform ascospores which may or may not separate into part-spores inside the ascus. Of these genera only *Torrubiella* is entomogenous.

- Calonectria pseudopeziza* (Desm.) Sacc., *Michelia* 1:307. 1878.
 = *Sphaeria pseudopeziza* Desm., *Ann. Sci. Nat. Bot. ser.* 2, 13:186. 1840.
 = *NECTRIA PSEUDOPEZIZA* (Desm.) Rossman, *comb. nov.*
 = *Calonectria mellina* (Durieu & Mont.) Höhnelt in Höhnelt & Weese, *Ann. Mycol.* 8:467. 1910.
 = *Sphaeria mellina* Durieu & Mont., *Expl. Sci. Algérie, Bot.* 1:497. 1849.
 = *Calonectria ochraceopallida* (Berk. & Br.) Sacc., *Atti Accad. Sci. Veneto-Trentino-Istria, Padova* 7:23. 1875.
 = *Sphaeria ochraceopallida* Berk. & Br., *Ann. Mag. Nat. Hist. ser. 2, 7:187. 1851*
 = *Calonectria plowrightiana* Sacc., *Michelia* 1:307. 1878.
 [= *Calonectria salicis* P. Larsen ex Munk, *Dansk Bot. Ark.* 17:55. 1957, *nom. nud.*]

Type: France. L'un est sur bois dénudé, un autre sur l'écorce d'un rameau que nous croyons appartenir au *Cytisus Laburnum*, et la troisième, enfin, sur l'*Arundo Donax*...recoltés dans les environs de Caen. M. Roberge.

The holotype specimen (PC) was examined. Occurring solitary to gregarious without a basal stroma, the pale-yellow ascocarps of *Nectria pseudopeziza* are globose, often flattened apically, and have a concolorous apical disc with a small, pointed papillae. In cross section, the ascocarp wall is 40-80 μm thick, divided into three regions with a dense middle layer which is composed of thick-walled cells. The ascocarp wall remains after the centrum disintegrates, leaving an empty outer shell. The narrowly-clavate asci are unitunicate and the ascospores are long-ellipsoid, 5- to 7-septate, 35-60 x 4-7 μm .

Calonectria pulchella (Starb.) Weese, Z. Garungsphysiol. 4: 230. 1914.

= *MALMEOMYCES PULCHELLUS* Starb., Bih. Kongl. Svenska Vetensk.-Akad. Handl. 25:32. 1899.

= *Chaetothyrium pulchellum* (Starb.) Theissen, Ann. Mycol. 11:496. 1913.

Type: Brazil. Rio Grande do Sul, col. Ijuhy ad ramulum juniorem Bambusae cujusdam mucidae in silva primaeva, 1/4 93. Una cum n:o 316.

An isotype specimen (FH-G) was examined. *Malmeomyces pulchellus*, the monotype species of *Malmeomyces*, is similar to species of *Nectria*, particularly those in the *Nectria peziza*-group as delimited by Samuels (1976a). The ascocarps are ochraceous, becoming collabent when dry, with four to eight, conspicuous, black setae forming a ring around the ascocarp apex. The unitunicate asci are clavate, each with an undifferentiated apex and the ascospores are one-septate, striate, 15-19 x 3-4 μm . The black setae on the ascocarps are the basis for retaining *Malmeomyces pulchellus* in its own genus; however, *Malmeomyces* is closely related to *Nectria*. Theissen (1913) considered *Malmeomyces* a synonym of *Chaetothyrium*.

Calonectria pulcherrima (Berk. & Br.) Sacc., Michelia 1:315. 1878.

= *NECTRIA PULCHERRIMA* Berk. & Br., J. Linn. Soc., Bot. 14:116. 1873.

Type: Ceylon. On bark. (no. 1102).

The holotype (K) and an isotype specimen (UPS) were examined. *Nectria pulcherrima* has solitary, scarlet ascocarps which are lightly scurfy. The walls of the ascocarps are composed of thick-walled cells forming *textura globulosa*. The unitunicate asci are narrowly clavate and the uniseptate ascospores are coarsely striate, ellipsoid with slight apiculus at each end, 22-24 x 8-10 μm .

CALONECTRIA PYROCHROA (Desm.) Sacc., *Michelia* 1:308. 1878.

≡ *Nectria pyrochroa* Desm., *Pl. Crypt. France* ed. 2 (2) #372. 1856.

= *Calonectria daldiniana* de Not., *Comment. Soc. Crittogam. Ital.* 2:477. 1867.

Type: France. In foliis emortuis Platani. Autumno. (Desmaz.)

The lectotype (PC) and isoelectotype specimens (BPI, BR, UPS) were examined. *Calonectria pyrochroa* is an earlier name for *Calonectria daldiniana*, the monotype species of *Calonectria*. The genus *Calonectria* is restricted to species having an ascocarp wall structure similar to *C. pyrochroa* and a *Cylindrocladium* anamorph. *C. pyrochroa* and its anamorph have been redescribed and illustrated by Rossman (1979). Thumen, *Fungi Austriaci* exs. #172 (BPI), issued as *Nectria pyrochroa*, is *Calonectria pyrochroa*.

Calonectria pyrrochlora (Auersw.) Sacc., *Michelia* 1:251. 1878.

≡ *Nectria pyrrochlora* Auersw. in Rabenh., *Fungi Europ.* #1234. 1869.

≡ *THYRONECTRIA PYRROCHLORA* (Auersw.) Sacc., *Michelia* 1:325. 1878.

≡ *Pleonectria pyrrochlora* (Auersw.) Winter, Rabenhorst's *Kryptogamen-Fl. Bd.* 1, Abt. 2:108. 1887.

Type: Germany. Arnstadiae, in *Aceris campestris* ramulis siccis leg. Fleischhack.

I have examined isotype specimens (BPI, CUP, FH-H). Seeler (1940) examined an isotype at FH which he listed as "type". Based on the muriform ascospores, this species belongs in *Thyronectria*; however, it is clearly related to species in the *Nectria aquifolii*-group as delimited by Booth (1959). Seeler (1940) redescribed and illustrated *Thyronectria pyrrochlora*.

[*Calonectria pyrrochlora* Sacc., *Syll. Fung.* 2:546. 1883, *nom. nud.*]

Type: None designated.

Saccardo (1883) listed *Calonectria pyrrochlora* Sacc. *nee* Auersw., as a synonym of *C. massariae* (= *Nectria decora*, ≡ *C. decora*). *C. pyrrochlora* Sacc. is a *nomen nudum* and an intentional later homonym of *C. pyrrochlora* (Auersw.) Sacc. (= *Thyronectria pyrrochlora*). This invalid species is listed as a synonym of *Nectria decora* (≡ *C. decora*) by Wollenweber & Reinking (1935), Booth (1971) and Pirozynski (1975).

CALONECTRIA QUINQUESEPTATA Figueiredo & Namekata, *Arch. Inst. Biol.* (São Paulo) 34:93. 1967.

Type: Brazil. Isolated from leaf spots of sugar-apple (*Annona squamosa* L.) and seedlings of eucalyptus (*Eucalyptus* sp.).

Dried isotype specimens of isolates from both hosts are housed at NY. This species is the teleomorph of *Cylindrocla-*

dium quinqueseptatum Boedijn & Reitsma. The ascocarps are similar in structure to those of *Calonectria pyrochroa* (= *C. daldiniana*, the monotype species of *Calonectria*) (Rossman, 1979). *Calonectria quinqueseptata* is correctly placed in *Calonectria sensu stricto*.

Calonectria rehmana Kirschst., Verhandl. Bot. Ver. Prov. Brandenburg 48:59. 1907.

Type: Germany. Auf einem durch *Humulus lupulus* zum Absterben gebrachten Stamme von *Cornus sanguinea*. Hasellake b. Gross-Behnitz. Oktober 1905.

The holotype specimen (B) had nothing on it resembling the described fungus. A specimen from S labelled *Calonectria n. sp.* has an illegible epithet written and signed by Kirschstein. The collection data on this specimen fit those published for the type specimen of *C. rehmana*. This specimen has only a few ascocarps left. The ascocarps are dark-red on a well-developed stroma, suggesting the *Nectria aquifolii*-group as delimited by Booth (1959). The narrowly-clavate asci are unitunicate and the ascospores are fusiform with rounded ends, three-septate, 24-27 x 6-7 μm . Without a better specimen this species cannot be adequately characterized. Wollenweber's drawing (1916) of the type specimen shows an associated *Fusarium*-like anamorph. Höhnelt (1912) and Wollenweber & Reinking (1935), followed by Booth (1971), stated that this species is a synonym of *Gibberella pulicaris* (Fries) Sacc.

CALONECTRIA RETEAUDII (Bugnicourt) Booth, Mycol. Pap. 104:41. 1966.

= *Neonectria reteaudii* Bugnicourt, Encycl. Mycol. 11: 189. 1939.

Type: Viet Nam. *Smithia Bequaertii*, collet et pivot. Sud-Annam (Province du Haut-Donnai, Blao); novembre 1936.

The holotype specimen is not at PC. Booth (1966) obtained the type culture which he lists "ex Herb. Paris, IMI 55922." Booth redescribed and illustrated this species suggesting that *Cylindrocarpon reteaudii*, the anamorph of *Neonectria reteaudii*, is simply a *Cylindrocladium* without a terminal vesicle. Likewise, the teleomorph appears similar to species of *Calonectria* having *Cylindrocladium* anamorphs (Rossman, 1979) and is correctly placed in *Calonectria*.

Calonectria richonii Sacc. [ut '*richoni*'], Syll. Fung. 2:542. 1883.

[= *Nectria mellina* Richon ex Sacc., Syll. Fung. 2:542. 1883, nom. nud. pro syn.]

= *NECTRIA PSEUDOPEZZIZA* (Desm.) Rossm., Mycotaxon 8:536. 1979.

Type: France. In ramis siccis Salicis Capreae, Saint-Amand.

Saccardo (1883) erected *Calonectria richonii* based on a specimen which Richon (1881) identified and reported as *Nectria mellina* ($\equiv$ *Calonectria mellina*). Because the asci and ascospores were smaller than those described for *N. mellina*, Saccardo thought Richon's specimen a different species for which he proposed a new name. Inadvertently, Saccardo also introduced the invalid, later homonym attributing it to Richon. I have examined the holotype specimen (PC) and find it to be *Nectria pseudopeziza* ($\equiv$ *Calonectria pseudopeziza*) of which *Nectria mellina* ($\equiv$ *C. mellina*) is an later synonym. Within *N. pseudopeziza* the ascospore size ranges from 25-60 x 4-7 μ m. This variability is characteristic of many long-spored ascomycetes.

Calonectria rickiana Sacc. & Syd., Ann. Mycol. 5:177. 1907.
 $\equiv$ *PUTTEMANSIA RICKIANA* (Sacc. & Syd.) Petrak, Ann.
 Mycol. 29:339. 1931.

Type: Brazil. Sao Leopoldo, in foliis Nectandrae, parasitice in peritheciis ascomycetis immaturi cujusdam, Julio 1906.
 Legit Pat. J. Rick, commun. H. Sydow.

The holotype specimen (PAD) was examined. Specimens in Theissen, Decades fungorum brasiliensium #88 (BPI, FH-G), issued as *Calonectria rickiana*, are authentic, collected in February, 1907. *Puttemansia rickiana* occurs on the carbonous stroma of *Phaeodorus lauracearum* Hohnel. The white to cream, fleshy ascocarps contain bitunicate asci and long-clavate ascospores. This species is correctly placed in *Puttemansia*. It is related to other species of hypocreoid Pleosporales in *Melioliphila* and *Podonectria*.

Calonectria rigidiuscula (Berk. & Br.) Sacc., Michelia 1:313. 1878.

$\equiv$ *NECTRIA RIGIDIUSCULA* Berk. & Br., J. Linn. Soc., Bot. 14:116. 1873.

= *Calonectria meliae* A. W. Zimm., Centralbl. Bakteriolog., 2. Abth. 7:106. 1901.

= *Calonectria cremea* A. W. Zimm., Centralbl. Bakteriolog., 2. Abth. 7:140. 1901.

= *Calonectria hibiscicola* P. Henn., Hedwigia 48:105. 1908.

= *Calonectria eburnea* Rehm, Hedwigia 37:196. 1898.

= *Calonectria sulcata* Starb., Bih. Kongl. Svenska Vetensk.-Akad. Handl. 25:29. 1899.

= *Calonectria tetraspora* (Seaver) Sacc. & Trott., Syll. Fung. 22:487. 1913.

$\equiv$ *Scoleconectria tetraspora* Seaver, North Amer. Flora 3:27. 1910.

[= *Calonectria squamulosa* Rehm ex Weese, Mitt. Bot. Lab. Techn. Hochsch. Wien 2:53. 1924, nom. nud.]

[= *Calonectria flavida* Massee ex Petch, Ann. Roy. Bot. Gard. Peradeniya 7:117. 1920, nom. nud.]

Type: Ceylon. On bark. (no. 173c).

The holotype specimen (K) was examined macroscopically and appears to agree with the descriptions and illustrations by authors who have examined it microscopically (Petch, 1920; Booth, 1971). The ascocarp wall structure and anamorph are quite unlike those of *Calonectria sensu stricto* (Rossman, 1979). This species is retained in *Nectria*. *N. rigidiuscula* as *Calonectria* has been described, illustrated and discussed by Petch (1920), Weese (1924, 1927), Wollenweber (1926), Reinking & Wollenweber (1927), Wollenweber & Reinking (1935), Booth & Waterston (1964) and Booth (1971). This organism, particularly as the anamorph *Fusarium decemcellulare* Brick, causes a disease of *Theobroma cacao* and other tropical plants.

[*Calonectria rubiginosa* A. L. Smith ex P. Syd., Just's Botanischer Jahresbericht 29:175. 1901, *lapsus calami*.]
 = *HYPOCRELLA RUBIGINOSA* A. L. Smith, J. Linn. Soc., Bot. 35:18. 1901.

Type: West Indies. Dominica. Parasitic on an old specimen of *Hypoxylon*, Castle Bruce River, Feb., 1896. No. 1497.

This name, published as *Hypocrella rubiginosa*, was mistakenly cited as *Calonectria* in Sydow's list of new fungi. The holotype specimen (K) was examined. This species is correctly placed in *Hypocrella* (Clavicipitales). Although this one is "parasitic" on *Hypoxylon*, most species of *Hypocrella* occur on scale insects.

Calonectria rubropunctata Rehm, Ann. Mycol. 7:539. 1909.
 = *Calonectria hohnelii* Rehm in Hohnel, Ann. Mycol. 2:43. 1904.

Type: Brazil. In hypophyllo folii *Eugeniae bagensis*. Sao Leopoldo, Rio Grande do Sul, 1908, Theissen S. J.

The holotype specimen (S) was examined. Authentic specimens were issued in Rick, Fungi Austro-americani #322 (BPI, FH-G, FH-P, NY, S) and Theissen, Decades fungorum brasiliensium #151 (BPI). This name is a later synonym of "*Calonectria*" *hohnelii*, the name under which the placement of this species is discussed.

Calonectria rutila Kirschst., Ann. Mycol. 37:116. 1939.
 = *CRYPTODISCUS RUTILUS* (Kirschst.) Rossman, *comb. nov.*

Type: Germany. Wald bei Rathenow. a. d. H. Auf morschem Kieferholz.

The holotype specimen (B) was examined. Notes inside the packet are labelled with the epithet "*dissipata*", an unpublished, alternative name. This species has unitunicate asci, each with the distinctly thickened apex of ostropalean fungi. After consultation with M. A. Sherwood, this species is placed in *Cryptodiscus*. Unlike most species of *Cryptodiscus* whose ascocarps are barely erumpent at maturity (Sherwood, 1977), the ascocarps of *C. rutilus* become almost superficial. The ascocarps are small apothecia occurring on well-rotted wood.

[*Calonectria salicis* P. Larsen ex Munk, Dansk Bot. Ark. 19: 55. 1957, *nom. nud.*]
 = *NECTRIA PSEUDOPEZIZA* (Desm.) Rossm., Mycotaxon 8:536. 1979.

Type: Denmark. On dead branches of *Salix* cfr. *alba* (Dec.; J.: Marielund near Kolding).

This name is not validly published as no diagnosis is provided. When Munk (1957) mentioned Poul Larsen's herbarium name, Munk noted that Larsen's specimen on *Salix* was exhausted. However, he stated that Larsen had previously determined another specimen on *Lonicera* to be *C. salicis*. Munk cited a specimen on *Lonicera* as "*Calonectria* cfr. *richonii* Sacc." I have examined this specimen (C) and find it to be *Nectria pseudopeziza* ($\equiv$ *Calonectria pseudopeziza*), of which *C. richonii* is a later synonym.

Calonectria sasae Hara, Bot. Mag. (Tokyo) 27:247. 1913.

Type (translated from Japanese): Japan. Parasitic on the sheath of *Sasa albo-marginata*. Collected in Kawakami village of Mino Province (Feb.)

The holotype specimen is not at TNS and has not been located.

Calonectria sceptri (Karst.) Sacc., *Michelia* 1:314. 1878.

= *Nectria dacrymycella* (Nyl.) Karst. var. *sceptri* (Karst.) Karst., *Fungi Fenn. exs.* #667. 1867.

= *Nectria sceptri* Karst., *Not. Sällsk. Flora Fenn. Förh.* 8:213. 1864.

= *NECTRIELLA SCEPTRI* (Karst.) Rossman, *comb. nov.*

= *Calonectria curtisii* (Berk.) Sacc., *Michelia* 1:316. 1878.

= *Nectria curtisii* Berk., *Grevillea* 4:46. 1875.

= *Calonectria dacrymycella* (Nyl.) Sacc. f. *aconiti* Sacc., *Syll. Fung.* 2:490. 1883.

= *Calonectria lacustris* Kirschst., *Ann. Mycol.* 34:186. 1936.

Type: Finland. Ad caules emortuos *Sceptri Carolini* in Subovi die 11 Julii.

The collection data cited above are taken from Karsten's (1864) first publication of this species in his article on fungi "in Lapponia orientali." In 1873 he cited similar collection data, "ad caules emortuos *Sceptri Carolini* in Lapponia maxime boreali, Subovi, mense Julio reperimus" and listed the exsiccatum, "Karst. Fung. Fenn. 667," which bears the data "Subovi, pa torra stjelkar af *Sceptrum carolin.*, 11 Juli 1861" and is labelled "*Nectria dacrymycella* Nyl. var. *sceptri*." In all cases it would seem that Karsten is referring to the same collection. In 1864 the ascospore size is listed as "longit. 10-12 mmm., crassit. 2-2,5 mmm.," while in 1874 Karsten cited this as "longit. 12 mmm., crassit. 2,5 mmm." and on the packet of *Fungi Fenniae* exs. #667, it is "14-18 mikr. longit., 3,5-4 cr." The holotype (H) and an isotype specimen (FH-H) of *Fungi Fenniae* exs. #667 were examined. This species is found to be a *Nectriella* having immersed ascocarps

and clavate asci, each with an apical ring. Ascospores of *N. sceptri* range from 12-20 x 2.5-4.5 μ m, thus including those cited in all Karsten's descriptions. The ascospores of *Sphaeria dacrymycella* ($\equiv$ *Calonectria dacrymycella*) are listed by Nylander (1863) as "longit. 0,016-18 millim., crassit. 0,004-5 millim." If the type collection of *S. dacrymycella* is identical to specimens identified later by Rehm, Ascomyceten #232 and #232b, as *Nectriella dacrymycella*, this name will provide an earlier epithet for the species.

Calonectria sensitiva (Rehm) Weese, Ann. Mycol. 8:423. 1910.

= *Nectria sensitiva* Rehm, Hedwigia 39:222. 1900.

= *NECTRIA LEUCORRHODINA* (Mont.) Samuels, Mem. New York Bot. Gard. 26:90. 1976.

Type: Brazil. Ad folia Mimosaceae. Rio de Janeiro. Ule no. 2274. H. P.

The holotype (S) and isotype specimens (FH-G, FH-H) were examined. This name is found to be a later synonym of *Nectria leucorrhodina* ($\equiv$ *Calonectria leucorrhodina*). Höhnelt & Weese (1910) stated that *N. sensitiva* is a synonym of *N. byssiseda* Rehm, also a synonym of *N. leucorrhodina*.

Calonectria soroccae Rehm, Hedwigia 39:224. 1900.

= *MELIOLIPHILA VOLUTELLA* (Berk. & Br.) Rossm., Mycotaxon 8:551. 1979.

Type: Brazil. Folia Soroccae ilicifoliae. Tubarao. Ule no. 1507c. H. Bresl.

The holotype (S) and isotype specimens (FH-G filed under *Mellitosporiopsis violacea* Rehm, FH-H) were examined. This name is found to be a later synonym of *Melioliphila volutella* ($\equiv$ *Calonectria volutella*).

[*Calonectria squamulosa* Rehm ex Weese, Mitt. Bot. Lab. Techn. Hochsch. Wien 2:53. 1924, nom. nud.]

= *NECTRIA RIGIDIUSCULA* Berk. & Br., J. Linn. Soc., Bot. 14:116. 1873.

Specimen cited: Philippines. Los Baños, auf Rinde von *Ficus Pseudopalma*, leg. M. B. Raimundo, comm. C. F. Baker, No. 1397b.

Rehm (1915) listed a specimen under *Calonectria sulcata* with the same collection data as those listed by Weese (1924) and on herbarium specimens (S, FH-H) labelled *C. squamulosa*. Rehm may have recognized the synonymy with *C. sulcata* and decided against publishing this name. However, Weese (1924) picked up the unpublished name and stated that the type species of *C. squamulosa* Rehm, 1913, is identical to *C. sulcata*, a later synonym of *Nectria rigidiuscula* ($\equiv$ *Calonectria rigidiuscula*). Examination of the specimen cited by Weese (1924) reveals that it is *Nectria rigidiuscula*, as previously recognized by Weese (1927), Reinking & Wollenweber (1927), Wollenweber & Reinking (1935) and Booth (1971).

Calonectria stromaticola P. Henn., Bot. Jahrbuch. Syst. 40: 226. 1908.

= *Berkelella stromaticola* (P. Henn.) Höhnelt, Sitzungsber. Kaiserl. Akad. Wiss., Math.-Naturwiss. Cl., Abt. 1, 119:824. 1909.

= *TUBEUFIA STROMATICOLA* (P. Henn.) Rossman, *comb. nov.*

Type: Peru. Berge südwestlich von Monzon, 2000-2500 m, auf ledrigen Blättern einer Lauracea, Weberbauer #3530.

Isotype specimens (FH-G, FH-H as '*leptostromaticola*') were examined. Because the holotype, presumably at B, has apparently been destroyed, the isotype in FH-G is here designated the LECTOTYPE. *Tubeufia stromaticola* occurs on the stroma of a microthyriaceous fungus on the upper surface of a leaf. The transparent, yellow ascocarps are densely covered with short, thick-walled hairs. The asci are bitunicate and the ascospores are long-clavate, finely punctate, 52-66 x 5.5-7.5 μ m.

Calonectria sulcata Starb., Bih. Kongl. Svenska Vetensk.-Akad. Handl. 25:29. 1899.

= *NECTRIA RIGIDIUSCULA* Berk. & Br., J. Linn. Soc., Bot. 14:116. 1873.

Type: Brazil. Rio Grande do Sul, col. Ijuhy ad truncum jacentum in silva primaeva, 7/4 93. N:o 336.

The holotype specimen (S) was examined. Weese (1914b) examined part of the type collection at B but this is apparently destroyed. In agreement with Weese (1924), Reinking & Wollenweber (1927), Wollenweber & Reinking (1935) and Booth (1971), this name is found to be a later synonym of *Nectria rigidiuscula* (= *Calonectria rigidiuscula*). For many years *Calonectria sulcata* was thought to be the oldest epithet and much of the older literature (Höhnelt, 1909; Weese, 1914b; Rehm, 1915) used this name for *Nectria rigidiuscula*.

Calonectria sulphurella Starb., Bih. Kongl. Svenska Vetensk.-Akad. Handl. 25:30. 1899.

= *NECTRIA FLAVOLANATA* Berk. & Br., J. Linn. Soc., Bot. 14: 114. 1873.

Type: Brazil. Rio Grande do Sul, col. Ijuhy ad corticem trunci humi jacentis, 29/3 93. N:o 305.

The holotype specimen (S) was examined. In agreement with Weese (1924), this name is found to be a later synonym of *Nectria flavolanata*. Weese (1914b) examined part of the type collection in H. Sydow's herbarium (B) but this apparently no longer exists. Weese noted that *C. sulphurella* was synonymous with *Nectria tjibodensis* and *N. flocculenta*, all synonyms of *N. flavolanata*. This common, tropical saprophyte on rotten wood has been redescribed and illustrated by Seaver (1928) as *Nectria rhytidospora* Pat. (= *N. flavolanata*).

Calonectria tarvisina (Speg.) Speg. ex Sacc. (ut 'Speg.'),
Syll. Fung. 2:540. 1883.
= *Calonectria macrospora* Sacc. & Speg. ssp. *tarvisina*
Speg., *Michelia* 1:464. 1879.
= *MASSARINA VIBURNICOLA* (Crouan & Crouan) Rossm., *Myco-*
taxon 8:550. 1979.

Type: Italy. In ramulo emortuo putrescente *Gleditschiae*
triacanthi, a Treviso, 22 Novemb. 1878, rarissime.

The holotype specimen (LPS) was examined. This name is
found to be a later synonym of *Massarina viburnicola* (= *Calo-*
nectria viburnicola).

Calonectria tessellata Petch, *Trans. Brit. Mycol. Soc.* 21:279.
1938.

Type: Britain. On decaying stalks of *Brassica*, North Wootton,
November 1935; on dead apple twig, Camberley, November 1920,
Hb. B. M.

The type specimens could not be located at K or elsewhere.

Calonectria tetraspora (Seaver) Sacc. & Trott., *Syll. Fung.*
22:487. 1913.

= *Scolecconectria tetraspora* Seaver, *North Amer. Flora*
3:27. 1910.

= *NECTRIA RIGIDIUSCULA* Berk. & Br., *J. Linn. Soc., Bot.*
14:116. 1873.

Type: Jamaica. Port Maria, on cacao trunks, November 14,
1902, F. S. Earle 455.

The holotype specimen (NY) was examined. In agreement
with Petch (1920), Reinking & Wollenweber (1927), Wollenweber
& Reinking (1935) and Booth (1971), this name is found to be
a later synonym of *Nectria rigidiuscula* (= *Calonectria rigi-*
diuscula).

CALONECTRIA THEAE Loos, *Trans. Brit. Mycol. Soc.* 33:17. 1950.

Type: Ceylon. On mature leaves of *Camellia theae* in culture.

The holotype specimen (IMI) reveals that *Calonectria*
theae is similar in ascocarp morphology and the *Cylindrocla-*
dium anamorph to *Calonectria pyrochora* (= *C. daldintiana*, the
monotype species of *Calonectria*) (Rossm., 1979). Loos (1950)
erected this name for the teleomorph that developed from a
culture of *Cercospora theae* Petch. Loos stated that this
Cercospora actually belonged in *Candelospora*, which is now
considered a synonym of *Cylindrocladium* (Boedijn & Reitsma,
1950). Peerally (1974b) redescribed and illustrated *Calonec-*
tria theae and its anamorph which causes "Cercospora di-
sease" of tea.

Calonectria theae Loos var. *crotalariae* Loos, *Trans. Brit.*
Mycol. Soc. 33:17. 1950.

= *CALONECTRIA CROTALARIAE* (Loos) Bell & Sobers, *Phyto-*
pathology 56:1364. 1966.

See *Calonectria crotalariae* for an account of this species.

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- Calonectria tineta* (Fuckel) Rehm, Ann. Mycol. 8:302. 1910.
 = *Cryptodiscus tinctus* Fuckel, Fungi Rhenani #1836. 1866.
 = *NECTRIELLA TINCTA* (Fuckel) R. Sant. in Eriksson, Sv. Bot. Tidskr. 58:235. 1964.
 = *Nectriella coccinea* Fuckel, Jahrb. Nassauischen Vereins Naturk. 23-24:177. 1870.
 = *Nectria fuckelii* Sacc., Michelia 1:289. 1878.
 = *Calonectria fuckelii* (Sacc.) Rehm in Transchel & Serebrianikow, Mycotheca Rossica fasc. 2, #68. 1910, non *C. fuckelii* (Fuckel) Sacc., 1878.
 = *Calonectria fuckelii* (Sacc.) Rehm f. *everniae* Rehm in Motouschek, Centralbl. Bakteriöl., 2. Abth. 42:105. 1915.

Type: Germany. Ad Hageniae ciliaris thallum apotheciaque, raro. Vere. In Jura colleg. Morthier.

The label of Fuckel, Fungi rhenani #1836, *Cryptodiscus tinctus* (FH-ex) includes a description of the species which is, therefore, validly published. Fuckel (1870) later listed *Cryptodiscus tinctus* as a synonym of his newly-described species, *Nectriella coccinea*, based on the same type specimen. Fuckel may have changed his mind about the identity of Fungi rhenani #1836 when he discovered that it was associated with *Illosporium coccineum* Fries. Of the isonyms, *Cryptodiscus tinctus* and *Nectriella coccinea*, the former provides the earlier epithet. The isotype specimen at FH-ex does not have any suitable fungus on it. From later descriptions (Weese, 1914c; Keissler, 1930; both as *Nectriella coccinea*) and later specimens of this species, a stable concept of *Nectriella tineta* has evolved. Specimens of Rehm, Ascomyceten #1897 issued as *Calonectria tineta* (BPI, CUP, PACA) and Transchel & Serebrianikow, Mycotheca rossica fasc. 2, #68, issued both as *C. tineta* (CUP) and *C. fuckelii* f. *everniae* (BPI, FH-ex), are all *Nectriella tineta*.

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- Calonectria transiens* Rehm, Hedwigia 39:225. 1900.
 = *NECTRIA ARENULA* (Berk. & Br.) Berk., Outl. Brit. Fung. p. 394. 1860.

Type: Brazil. Folium putridum Agaves. Ule no. 841. b. H. Bresl.

The holotype (S) and isotype specimens (FH-H, S) were examined. This name is found to be a later synonym of *Nectria arenula* as noted by Samuels (1978). *N. arenula* is redescribed and illustrated by Samuels (1978) and Booth (1959).

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- Calonectria trichilae* Rehm, Hedwigia 37:198. 1898.
 = *MELIOLIPHILA VOLUTELLA* (Berk. & Br.) Rossm., Mycotaxon 8:551. 1979.

Type: Brazil. Feuilles de Trichilia. Balansa pl. du Paraguay no. 4015. H. B.

Two isotype specimens, both in FH-H, were examined. This name is found to be a later synonym of *Melioliphila volutella* ($\equiv$ *Calonectria volutella*). Rehm (1898) noticed that *Calonectria trichilae* was related to *C. ambigua* ($\equiv$ *Melioliphila volutella*). Weese (1914b, 1927) stated that *C. trichilae* was synonymous with *C. melioloides* ($\equiv$ *Melioliphila melioloides*).

Calonectria truncata Petch, Trans. Brit. Mycol. Soc. 25:257. 1942.

Type: West Indies. St. Lucia, on a leaf-hopper, 20 November 1939, collected by Mr. R. G. Fennah.

The type collection is not at K and has not been located. The habit on leafhoppers and associated *Hirsutella* anamorph suggests that this species belongs in the Clavicipitales.

Calonectria tubaraoensis Rehm, Hedwigia 37:195. 1898.
= *NECTRIA LEUCORRHODINA* (Mont.) Samuels, Mem. New York Bot. Gard. 26:90. 1976.

Type: Brazil. In utraque pagina foliorum Tragiae? Tubarao. 7/1890. Ule no. 1514. H. B. Blatt einer Mikania. Ule no. 592. H. B. Blatt einer Trigonía. Tubarao. 7/1890. Ule no. 1021, 923a. Oberseite der Blätter von Abutilon. Ule no. 1177. H. B. Blätter von Mendons. Velloz. Ule no. 912b. H. B. Baumblätter. Rio de Janeiro. 9/1887. Ule no. 1524b. H. B. Blatt einer Malvacee. Ule no. 59. H. P.

Several of the syntypes were examined. Ule #923a (S) is here designated the LECOTYPE. The lectotype and Ule #1021 (FH-H) are *Nectria leucorrhodina* ($\equiv$ *Calonectria leucorrhodina*). Ule #1524b (FH-G) is *Calloriopsis gelatinosa* (Ellis & Everh.) Dennis. From the original publication, it is apparent that Rehm was describing *Nectria leucorrhodina* of which *Calonectria tubaraoensis* is a later synonym. Weese (1914a) noted that *C. tubaraoensis* was synonymous with *C. leucorrhodina* ($\equiv$ *Nectria leucorrhodina*). Rehm, Ascomyceten #1920 issued as *C. tubaraoensis* (BPI, CUP, FH-G, NY) is *Nectria leucorrhodina*.

Calonectria ugandae Hansf., Proc. Linn. Soc. Lond. 153:35. 1941.

= *MELIOLIPHILA VOLUTELLA* (Berk. & Br.) Rossm., Mycotaxon 8:551. 1979.

Type: Uganda. In plagulas *Irenis natalensis* parasitica, in foliis *Oncobae spinosae*, Entebbe Road, Hansford 2490.

The holotype (IMI) and authentic specimens (BPI: Hansford 2835, 3192, 3326, 3327, 3332, 3362, 3371, 3372; PREM: Hansford 3327) were examined. This species belongs in *Melioliphila*; the name is found to be a later synonym of *M. volutella* ($\equiv$ *Calonectria volutella*).

Calonectria ukolayii Thaug, Trans. Brit. Mycol. Soc. 67:435. 1976.

= *NECTRIA LEUCORRHODINA* (Mont.) Samuels, Mem. New York Bot. Gard. 26:90. 1976.

Type: Burma. Rangoon, in coloniis *Meliolae tabernaemontanicolae* Hansf. & Thirm. in foliis vivis *Vallaris heynii* Spreng., Maung Mya Thaug, 23 Jan., 1975, IMI 191468b, holotypus.

the holotype specimen (IMI) was examined. This is a later synonym of *Nectria leucorrhodina* (= *Calonectria leucorrhodina*). The associated anamorph, *Cylindrocarpon ukolayii* Thaug, appears to be the *Cephalosporium* (= *Acremonium*) often found with this species which is described by Gams (1971) as the anamorph of *Calonectria cephalosporii* (= *N. leucorrhodina*).

Calonectria ulicis (Crouan & Crouan) Sacc., *Michelia* 1:316. 1878.

= *NECTRIA ULICIS* Crouan & Crouan, *Florule du Finistère* p. 38. 1867.

Type: France. Finistère, sur les racines et tiges mortes d'Ajonc. Pr. p. c.

Isotype specimens (CO) consisting of two packets were examined. The one with Crouan's drawings is here designated the LECTOTYPE. In addition four more packets of authentic collections (CO) were examined. This species is found to be a *Nectria* with uniseptate spores belonging to the *Nectria mammoidea*-group as delimited by Booth (1959).

Calonectria umbelliferarum Seaver, *Mem. New York Bot. Gard.* 6:507. 1916.

= *NECTRIA ERUBESCENS* (Desm.) Phill. & Plowr., *Grevillea* 10:70. 1881.

Type: Bermuda. Near Harrington Sound, on dead stems of *Foeniculum foeniculum*.

The holotype specimen (NY) was examined. In agreement with Samuels (1978) this name is found to be a synonym of *Nectria erubescens* (= *Calonectria erubescens*).

Calonectria uniseptata Gerlach, *Phytopath. Z.* 61:379. April 1968.
= *CALONECTRIA KYOTENSIS* Terashita, *Trans. Mycol. Soc. Japan* 8:124. 1 Jan. 1968.

Type: Germany. In culturis puris *Cylindrocladii scoparii* ex radicibus putridis *Paphiopedili callosi*; Celle, IV 1967. Typus in herbario Instituti Mycologici sub No. 10759 conservatur (Biologische Bundesanstalt, Berlin-Dahlem).

An isotype specimen (NY) of the type culture was examined. In agreement with Peerally (1974a), this name is found to be a later synonym of *Calonectria kyotensis*.

Calonectria uredinophila H. Syd., *Ann. Mycol.* 27:422. 1929.

Type: China. Parasitica in uredosoris Pucciniae *Phyllostachydis* Kus. ad folia *Phyllostachydis* spec., prov. Chekiang, Hangchow, X. 1928 (no. 2406 ex p.).

Although listed by Tai (1937), the type specimen has not been located.

Calonectria varians Sacc., *Michelia* 1:52. 1877.

= *NECTRIA VARIANS* (Sacc.) Rossman, *comb. nov.*

Type: Italy. In ramis putrescentibus corticatis Mori albae, socia *Botryosphaeria pulicari* & *moricola*, a Selva Aug. 1876.

The scanty holotype specimen (PAD) was examined. This hypocreaceous species is related to *Nectria citrinoaurantia* (= *Calonectria citrinoaurantia*). *Nectria varians* has small, translucent-yellow, smooth ascocarps crowded on a well-developed stroma. The asci are unitunicate and the ascospores are broadly-ellipsoid, three-septate, 19-24 x 6-8 μ m. The stroma develops at the base of, or through the old stromata of *Gibberella* species. This may be what led Wollenweber & Reinking (1935), followed by Booth (1971), to suggest the synonymy of *C. varians* with *Gibberella baccata* (Wallr.) Sacc.

Calonectria venezuelensis H. Syd., *Ann. Mycol.* 33:88. 1935.

Type: Venezuela. In foliis putridis Fici radulae Willd., El Limon (no. 301).

The holotype specimen has not been located.

Calonectria vermispora Masee & Crossland, *Naturalist*, Hull 1904:4. 1904.

= *Dialonectria vermispora* (Masee & Crossland) Masee & Crossland, *Fungus Flora Yorkshire* p. 214. 1905.

= *NECTRIA HIRTA* Bloxam in Currey, *Trans. Linn. Soc. London* 24:158. 1863.

Type: England. On a decorticated fallen trunk, Hardcastle. Coll. J. Needham, November 1897.

The holotype specimen (K) has nothing left of the described fungus. Petch (1938) considered this species a synonym of *Trichonectria hirta* (= *Nectria hirta*, = *Calonectria hirta*) and from the original description, *C. vermispora* is most probably a later synonym of this distinctive species.

Calonectria vernoniae (Hansf.) Rossman, *Mycologia* 69:366. 1977.

= *Ophionectria vernoniae* Hansf., *Proc. Linn. Soc. London* 158:39. 1945.

= *NECTRIA VERNONIAE* (Hansf.) Rossman, *comb. nov.*

Type: Uganda. In foliis *Vernoniae campaneae*, Entebbe Road, Hansford 3502.

The holotype (IMI), an isotype (PREM) and an authentic specimen (IARI) were examined. This species is unique in having small, yellow-brown ascocarps superficial on living leaves, unitunicate asci and long, vermiform, multiseptate ascospores, 70-110 x 2-3 μ m. The ascocarp structure is unlike that of *Calonectria pyrochroa* (= *C. daldiniana*, the monotype species of *Calonectria*) (Rossman, 1979); *C. vernoniae* is, therefore, placed in *Nectria*. The ascocarp wall of *Nectria vernoniae* is 18-22 μ m thick, consisting of two layers. The outer layer is prosenchymatous while the inner one is pseudoparenchymatous, composed of small, thin-walled, elongate cells. This ascocarp structure suggests that *N. verno-*

niae belongs in the *Nectria muscivora*-group as delimited by Samuels (1976a)

Calonectria verrucosa Pat., Bull. Soc. Mycol. France 11:228. 1895.

= *NECTRIA ASTROMATA* (Pat.) Rossman, *nom. nov.*

Type: Ecuador. Tiges pourries de Chusquea. San Jorge.

The holotype specimen (FH-P) was examined. This species has yellow, warty ascocarps which are superficial on the substrate. In structure the ascocarps are similar to those of *Nectria rigidiuscula* (= *Calonectria rigidiuscula*) but, like *N. albosuccinea* (= *C. albosuccinea*), *N. verrucosa* lacks a well-developed stroma, as the new epithet suggests. The asci are unitunicate and the ascospores are long-fusiform with rounded ends, 7- to 9-septate, 50-62 x 7-9 μ m. The epithet of the basionym of *N. astromata* is preoccupied in *Nectria* by *N. verrucosa* (Schw.) Sacc., 1883.

Calonectria verruculosa Niessl in Thumen, Instituto; Rev. Sci. Litt. Coimbra 27:251. 1879.

= *Nectria verruculosa* (Niessl) Penzig, *Michelia* 2:420. 1882.

= *NECTRIA RALFSII* Berk. & Br., *Ann. Mag. Nat. Hist.*, ser. 2, 13:467. 1854.

Type: Portugal. Felgueiras in ramis emortuis adhuc erectis Citri Limoni Risso, ut videtur parasitans in pyreniis stylosporiferis Anthostomellae. Vere 1879. Raro. leg. Prof. J. A. Henriques.

The type collection of this species was issued in Thumen, Mycotheca universalis #1550 (B, BPI, FH-H, NY, NYS) and Roumèguère, *Fungi selecti* exs. #4760 as *Nectria verruculosa* (BPI, NY). The isotype specimen of Mycotheca universalis #1550 at NY is here designated the LECTOTYPE. In agreement with Weese (1914b, 1918) and Booth (1959), this species is found to be a later synonym of *Nectria ralfsii* having a *Myrothecium* anamorph. Booth (1959) redescribed, illustrated and listed the synonyms of *N. ralfsii*.

Calonectria viburnicola (Crouan & Crouan) Sacc., *Michelia* 1:311. 1878.

= *Nectria viburnicola* Crouan & Crouan, *Florule de Finistère* p. 39. 1867.

= *MASSARINA VIBURNICOLA* (Crouan & Crouan) Rossman, *comb. nov.*

= *Calonectria macrospora* Sacc. & Speg., *Michelia* 1:251. 1878.

= *Calonectria tarvisina* (Speg.) Speg. ex Sacc. (ut 'Speg'), *Syll. Fung.* 2:540. 1883.

Type: France. Finistère, sur les rameaux morts de *Viburnum tin.* Pr. r. r.

The holotype specimen (CO) was examined. This species has bitunicate asci in immersed ascocarps which show only the bright yellow-orange wall around the ostiole and are surrounded by a poorly-developed clypeus. The ascospores are

long-fusiform, hyaline, becoming golden-brown with age, 5- to 9-septate, constricted at the central septum, 58-77 x 8-14 μm .

Calonectria volutella (Berk. & Br.) Sacc., *Michelia* 1:309. 1878.

= *Nectria volutella* Berk. & Br., *J. Linn. Soc., Bot.* 14:115. 1873.

= *MELIOLIPHILA VOLUTELLA* (Berk. & Br.) Rossman, *comb. nov.*

= *Lasionectria volutella* (Berk. & Br.) Cooke, *Grevillea* 12:112. 1884.

= *Calonectria ambigua* Speg., *Anales Soc. Ci. Argent.* 12: 212. 1881

= *Subiculicola ambigua* (Speg.) Speg. [*ut* 'Speg'], *Bol. Acad. Nac. Ci.* 26:347. 1924.

= *Calonectria trichilae* Rehm, *Hedwigia* 37:198. 1898.

= *Calonectria soroccae* Rehm, *Hedwigia* 39:224. 1900.

= *Calonectria graminicola* Stevens, *Bot. Gaz.* 45:232. 1918, non *C. graminicola* (Berk. & Br.) Wollenw., 1913.

= *Melioliphila graminicola* Stev. [*ut* '(Stev.) Speg'], *Bol. Acad. Nac. Ci.* 26:34. 1924.

= *Calonectria ugandae* Hansf., *Proc. Linn. Soc. Lond.* 153: 35. 1941.

= *Calonectria chorleyi* Hansf., *Mycol. Pap.* 15:124. 1946.

Type: Ceylon. On leaves of *Atalanta monophylla* on a lichenoid hispid white crust. (nos. 445, 448).

Syntype specimens (K-#445, UPS-number unknown) were examined; the specimen at K is here designated the LECTOTYPE. Occurring on *Meliola*, this species has white, fleshy ascarps and bitunicate asci. The ascospores are clavate, three-septate, 30-33 x 8-10 μm . This is the earliest epithet for *Calonectria graminicola* Stev., the monotype species of *Melioliphila*. *M. volutella* is associated with an *Eriomyeopsis* anamorph. Pirozynski (1976) mistakenly cited *Melioliphila melioloides* as the type species of *Melioliphila*. See *C. ambigua* for further discussion of *Melioliphila* and *Subiculicola*.

Calonectria warburgiana P. Henn. in O. Warburg, *Monsunia* 1: 25. 1899.

= *MELIOLIPHILA BALANSEANA* (Berl. & Roum.) Piroz., *Kew Bull.* 31:596. 1976.

Type: Indonesia. Moluccas, Batjan: auf Blättern von *Phyllocladus digitata* Warb. (O. Warburg.)

An isotype specimen (FH-H) no longer has any of the described fungus on it. Weese (1927) examined the holotype specimen from B, which apparently has been destroyed, and stated that *C. warburgiana* was a synonym of *Calonectria balanseana*. From the original description, Weese seems to be correct and this species is considered a later synonym of *Melioliphila balanseana* (= *Calonectria balanseana*).

Calonectria xantholeuca (G. Kunze ex Fries) Sacc., Syll.

Fung. 2:547. 1883.

= *Sphaeria xantholeuca* G. Kunze ex Fries, Syst. Mycol.
2:503. 1822.

Type: Switzerland. In caulibus *Epilobii*.

The holotype specimen (UPS) was examined. The only fungus present was pycnidial. From the original description and thost of Strasser (1911), this species probably belongs in *Nectriella* but until a good authentic specimen is found, the species cannot be accurately characterized.

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ADDENDUM

Calonectria camelliae Shipton, Trans. Brit. Mycol. Soc. 72:163. 1979.

[= *Calonectria camelliae* Shipton & Booth in Shipton, Trans. Brit. Mycol. Soc. 69:59. 1977, *nom. nud.*]

Type: Australia. IMI 174836 e fructis arboris pluviosilvestris ignotae, Whitfield Range prope Cairns, Queensland, January 1973, sejunctus.

The holotype of this species has not been examined. From the illustrations and *Cylindrocladium* conidial state, it appears to belong in *Calonectria sensu stricto*. The ascospores are relatively short (6.7-10.7 μ m) and uniseptate. In the anamorph, *Cylindrocladium camelliae* Venkataramani & Venkata Ram, the presence of a terminal vesicle is variable, "rare in older cultures", suggesting that this structure should not be considered of great taxonomic importance.

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NEW COMBINATIONS IN *RHIZOPLACA* FOR ENDEMIC AMERICAN SPECIES OF *LECANORA* AUCTT.

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SUMMARY

Three new combinations, Rhizoplaca glaucophana, R. haydenii and R. marginalis are proposed, with notes on previously unreported characters.

The genus *Rhizoplaca* Zopf was recently revived for some umbilicate species formerly included in *Lecanora* (Leuckert, Poelt & Hähnel 1977). However, only those species occurring in Eurasia were treated. North America contains three endemics that should also be transferred.

RHIZOPLACA GLAUCOPHANA (Nyl. ex Hasse) W. A. Weber, comb. nov. Based on *Lecanora glaucophana* Nyl. ex Hasse, Lich. S. Calif. ed. 2 [of McClatchie 1897]: 11. 1898.

According to Poelt (1958) this taxon was known only from the type specimen from the San Gabriel Mountains of California, 1300 msm, June 1897, *Hasse in herb. Nylander no. 28256 (H)*. Recently Miss Jeanne Larson collected ample material of it on the San Joaquin Experimental range.

The spores, of which Poelt found only undeveloped individuals, are narrowly oblong, curved and often narrower at one end, 15-20 X 3-5 μ m. Spores in the other species of the genus are broadly ellipsoid or almost spherical. The pycnidia are visible as black surface dots and the pycnoconidia are acicular, curved, 25-40 X less than 1 μ m. *R. glaucophana* might be mistaken for a juvenile thallus of *R. marginalis* but although its largest thalli reach a diameter of only 7 mm they are fully fertile even at 3 mm and they have immersed brown apothecia which only in age develop even a slight tendency to marginal rim formation and are very rarely lightly pruinose on the disk and thallus. *R. marginalis* develops a large thallus up to 2 cm, has blue-black, adnate apothecia with prominent contorted rims, and the entire thallus is very thickly pruinose.

Its spores are nearly spherical. *R. glaucophana* ranges widely through southern California west of the Sierra Nevada. Calaveras Co.: Winton Road, 7 mi E of Westpoint, open moist hillside, 4100 ft. alt., Blue Mountain Quadr., T6N R13E Sec 36, with *Cercocarpus* and *Mimulus* on exposed andesite mudflow, 21 May 1975, T. E. Weier 968 (COLO L-61,-643). Monterey Co.: Hastings Natural History Reservation, 1200-1400 ft. alt., 12 Feb. 1944, J. M. Linsdale (COLO L-29018). Madera Co.: San Joaquin Experimental Range, 28 mi N of Fresno, on granodiorite outcrops, 300-350 msm, 11 Dec. 1978, J. R. Larson (COLO L-66706-66709).

RHIZOPLACA HAYDENII (Tuck.) W. A. Weber, *comb. nov.* Based on *Lecanora haydenii* Tuck., Proc. Amer. Acad. Arts Sci. 6:267. [1864] 1866.

Poelt reported this taxon only from Nebraska and Wyoming. It is present in Montana: Carbon Co.: Beartooth Plateau, 12,600 ft., 15 Aug. 1977, Nash 15164 (ASU, COLO); Park Co.: on soil, travertine mines ca. 2 km N of Gardiner, 18 April 1977, DeSpain 103 (COLO).

RHIZOPLACA MARGINALIS (Hasse) W. A. Weber, *comb. nov.*

Based on *Lecanora marginalis* Hasse, The Bryologist 13: 112. 1910.

This taxon has a peculiar distribution involving both the eastern and western bases of the Sierra Nevada Range in southern California, suggesting that its origin possibly antedates the uplift of the range. The substrate for the type was given as "on shaded lava and basaltic rocks at Little Lake Station, Inyo County" but I searched for it there without success. However, *R. marginalis* is common on huge granite boulders on the road to Whitney Portal, across the draw from the first Forest Camp W of Lone Pine (COLO L-35237). Since this is the only substrate it has been found on in its entire range I believe it likely that Hasse's statement was incorrect. Elsewhere in California *R. marginalis* is now known to occur in Tulare and Madera counties. Pycnoconidia are curved, acicular, 25-40 X <1 μ m.

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REVUE DES LIVRES

par

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SETAS DEL PAIS VASCO, par la Sociedad de Ciencias Naturales Azarandi, en pochettes: 1-2e série, 54 pls., 1972; 3e série, 36 pls. 1973; 4e série, 36 pls., 1974; 5e série, 36 pls., 1975; 6e série, 36 pls., 1976, 7e série, 36 pls., 1977. Ed. Sociedad de Ciencias Naturales AZARANDI, Seccion di micologia, Caja de Ahorros Municipal, San Sebastian, España.

L'ouvrage se présente sous forme de fiches de format 21 x 15 cm, portant sur une face la photographie de l'espèce et son nom, de l'autre, une courte notice descriptive. La qualité de la reproduction est irrégulière mais l'ensemble des 234 illustrations vaut cependant la peine et représente déjà un bon échantillon de la mycoflore du pays basque. La série sera régulièrement continuée.

MUSHROOMS OF NORTH AMERICA, par Orson K. MILLER, Jr. , 368p., 292 phot. col., 108 figs., 21x14 cm., paperback, 1977. Ed. E. P. Dutton & Co, 201 Park Ave South, New York, NY 10003. Prix US \$ 8.95.

L'auteur a voulu un livre didactique, à la portée de tous et cependant un livre scientifique, sans approximation. Il emploie l'image pour rendre parlantes les clés majeures, et pour définir les termes techniques réunis dans le glossaire. C'est aussi par une photographie de haute qualité qu'il guide le mycologue débutant au coeur du sujet. 422 espèces sont décrites, 280 sont illustrées; chacune fait l'objet de commentaires visant à les distinguer d'espèces voisines, au nombre de 258 citées. La caractéristique de l'ouvrage est l'importance des clés, clés des classes et des familles, clés des genres et des espèces. Les noms d'espèces sont correctement cités avec noms d'auteurs. Les descriptions sont détaillées. L'édition est fort agréable.

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- page 455, line 33: *for* (Died. *read* Died.
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- page 25, line 2: *for* *A. majusculus* *read* *A. majusculus* var. *majusculus*
 33, 36: *for* *A.* *read* *Agaricus*
 40, 28: *for* *badius* *read* *subplacomycetes* var. *badius*
 65, 37; *for* *rodmani* *read* *rodmanii*
 46: *for* *rodmani* *read* *rodmanii*
 72, 10: *for* *triculphuratus* *read* *trisulphuratus*
 108, 42: *for* *micromegatha* *read* *micromegathus*
 111, 26: *for* *rodmani* *read* *rodmanii*
 118, 23: *for* *diminitivus* *read* *diminutivus*
 157, 9; 158, line 25; 160, line 16; 162, lines 1, 8, 17, 24,
 34: *for* *capsulata* *read* *capsulatus*
 191, 36: *for* *barleana* *read* *barlaeana*
 233, 4: *for* LAGERSTRAEMIA *read* LAGERSTROEMIA
 lines 10 & 14: *for* *lagerstraemiae* *read* *lagerstroemiae*
 line 16: *for* *Lagerstraemia* *read* *Lagerstroemia*
 234, 1; 235, line 1; 236, line 38: *for* *lagerstraemiae* *read*
lagerstroemiae
 236, 39: *for* LAGERSTRAEMIAE *read* LAGERSTROEMIAE
 304, *add*: ERRATUM: The holotype collection, ES #2520, has been di-
 vided among 3 herbaria. The portion at MPDD is the holo-
 type, those at OSC and IMI are isotypes. The paratype
 collection, ES #2522, is also divided, that at MPPD the
 paratype, those at OSC and IMI isoparatypes.
front cover 8(1), CONTENTS line 8: *for* Barundi *read* Burundi
 26: *for* BARR *read* FARR
 30: *for* *Lagerstraemia* *read* *Lagerstroemia*

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